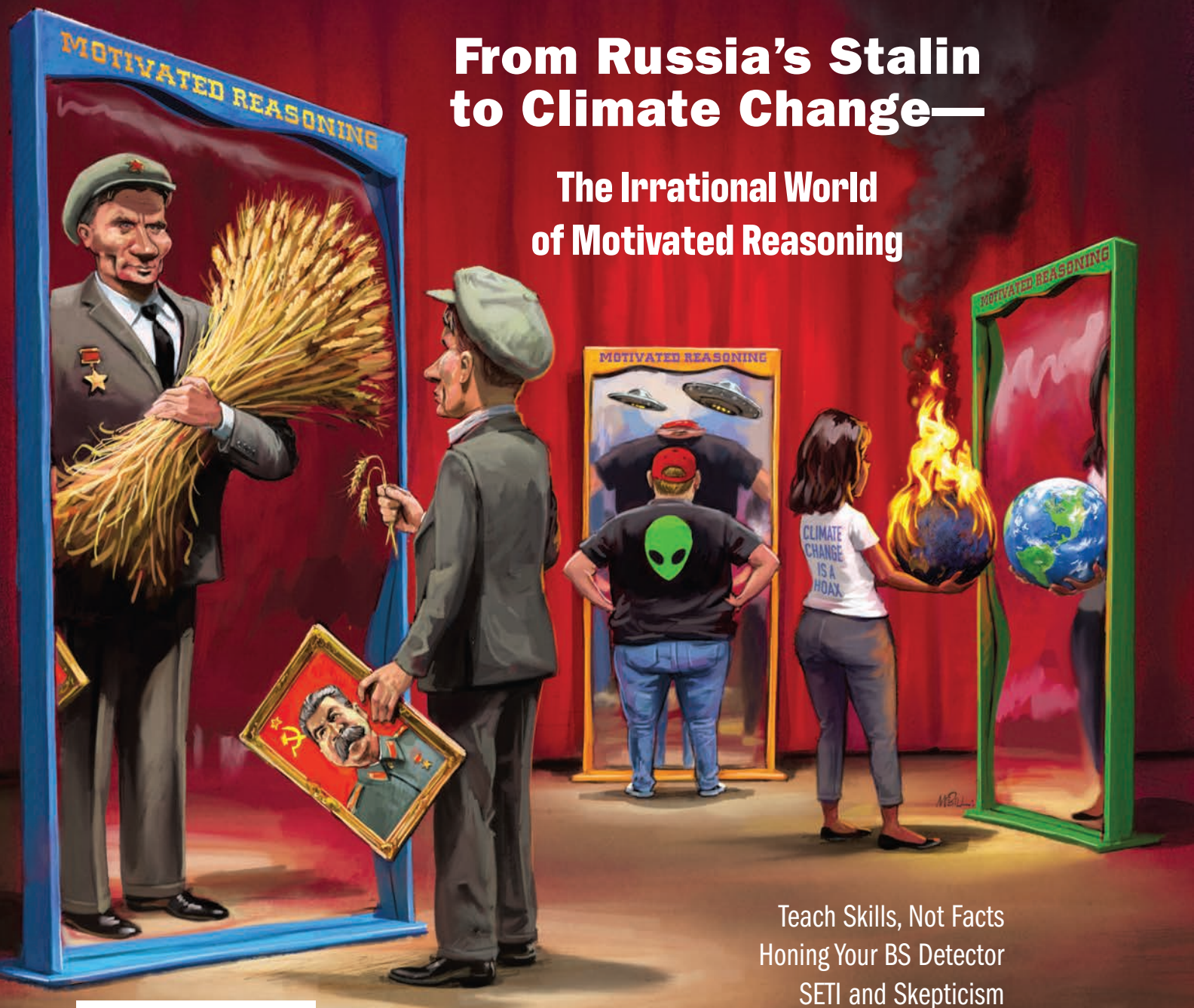
Bigfoot Bear | Science Denialism | Anti-Vaxxers | Aging | *Jeopardy!* and Coincidences | Psychic Surgery

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 46, No. 1 | January/February 2022



From Russia's Stalin to Climate Change—

The Irrational World of Motivated Reasoning

Teach Skills, Not Facts

Honing Your BS Detector

SETI and Skepticism

Satanic Panic Update

SPECIAL REPORT: **Take Sodom Meteor Strike Claims with a Pillar of Salt**

$5.99

02>

0 09281 02614 3

Committee for Skeptical Inquiry

Committee for Skeptical Inquiry | www.skepticalinquirer.org

Robyn E. Blumner,* President and CEO
Barry Karr,* Executive Director
Joe Nickell, Senior Research Fellow
Massimo Polidoro, Research Fellow
Benjamin Radford, Research Fellow
Richard Wiseman, Research Fellow

Fellows

James E. Alcock*, psychologist, York Univ., Toronto
Marcia Angell MD, former editor-in-chief, *New England Journal of Medicine*
Kimball Atwood IV MD, physician, author, Newton, MA
Banachek, professional magician/mentalist magic consultant/producer
Stephen Barrett MD, psychiatrist, author, consumer advocate, Pittsboro, NC
Robert Bartholomew, sociologist and investigative journalist, Botany College in Auckland, New Zealand.
Jann Johnson Bellamy, attorney, writer for *Science-Based Medicine* blog, Tallahassee, FL
Kenny Biddle, investigator, writer, podcaster, public speaker
Irving Biederman, psychologist, Univ. of Southern CA
Sandra Blakeslee, science writer; author; *New York Times* science correspondent
Susan Blackmore, visiting lecturer, Univ. of the West of England, Bristol
Mark Boslough, physicist, Sandia National Laboratories (retired), Albuquerque, New Mexico
Henri Broch, physicist, Univ. of Nice, France
Jan Harold Brunvand, folklorist, professor emeritus of English, Univ. of Utah
Sean B. Carroll, molecular geneticist, vice president for science education, Howard Hughes Medical Institute, Madison, WI
Thomas R. Casten, energy expert; chair, Myno Carbon Corp., Hinsdale, IL
Timothy Caulfield, professor of health law and policy, University of Alberta, Canada
K.C. Cole, science writer, author, professor, Univ. of Southern California's Annenberg School of Journalism
John Cook, Center for Climate Change Communication, George Mason University, Virginia
Frederick Crews, literary and cultural critic, professor emeritus of English, Univ. of CA, Berkeley
Richard Dawkins, zoologist, Oxford Univ.
Geoffrey Dean, technical editor, Perth, Australia
Daniel C. Dennett, Univ. professor and Austin B. Fletcher Professor of Philosophy, director of Center for Cognitive Studies at Tufts Univ.
Ann Druyan, writer and producer; CEO, Cosmos Studios, Ithaca, NY
Sanal Edamaruku, president, Indian Rationalist Association and Rationalist International
Edzard Ernst, emeritus professor, Complementary Medicine, Peninsula Medical School, Universities of Exeter and Plymouth, Exeter, UK
Kenneth Feder, professor of anthropology, Central Connecticut State Univ.
Krista Federspiel, medical journalist, author, folklorist
Kevin Folta, molecular biologist. Professor and chairman of the Horticultural Sciences Department at the University of Florida
Barbara Forrest, professor of philosophy, SE Louisiana Univ.
Andrew Fraknoi, astronomer, U. of San Francisco
Kendrick Frazier*, science writer, editor, Skeptical Inquirer
Christopher C. French, professor, department of psychology, and head of the Anomalistic Psychology Research Unit, Goldsmiths College, Univ. of London
Julia Galef, writer, podcaster, public speaker
Luigi Garlaschelli, chemist, Università di Pavia (Italy), research fellow of CICAP, the Italian skeptics group
Maryanne Garry, professor, Dept. of Psychology, University of Waikato, New Zealand
Susan Gerbic, founder and leader of the Guerrilla Skepticism on Wikipedia (GSoW) project
Thomas Gilovich, psychologist, Cornell Univ.
David H. Gorski, cancer surgeon and researcher at Barbara Ann Karmanos Cancer Institute and chief of breast surgery section, Wayne State University School of Medicine
Wendy M. Grossman, writer; founder and first editor, *The Skeptic* magazine (UK)
Susan Haack, Cooper Senior Scholar in Arts and Sciences, professor of philosophy and professor of Law, Univ. of Miami
Harriet Hall MD, family physician, investigator, Puyallup, WA
David J. Helfand, professor of astronomy, Columbia Univ.
Terence M. Hines, prof. of psychology, Pace Univ., Pleasantville, NY
Douglas R. Hofstadter, professor of human understanding and cognitive science, Indiana Univ.
Gerald Holton, Mallinckrodt Professor of Physics and professor of history of science, Harvard Univ.
Deborah Hyde, folklorist, cultural anthropologist, and former editor in chief of the UK-based magazine *The Skeptic*
Ray Hyman*, psychologist, Univ. of Oregon
Stuart D. Jordan, NASA astrophysicist emeritus, science advisor to Center for Inquiry Office of Public Policy, Washington, D.C.
Barry Karr, executive director, Committee for Skeptical Inquiry, Amherst, New York
Edwin C. Krupp, astronomer, director, Griffith Observatory, Los Angeles, CA
Lawrence Kusche, science writer
Stephan Lewandowsky, psychologist, researcher, Univ. of Bristol, United Kingdom
Lin Zixin, former editor, *Science and Technology Daily* (China)
Jere Lipps, Museum of Paleontology, Univ. of CA, Berkeley
Elizabeth Loftus, professor of psychology, Univ. of CA, Irvine
William M. London, professor of public health, California State University, Los Angeles
Daniel Loxton, writer, artist, editor, *Skeptic* magazine
Michael E. Mann, distinguished Professor of Atmospheric Sciences and director of the Earth Systems Sciences Center at the Pennsylvania State University
David Marks, psychologist, City Univ., London
Mario Mendez-Acosta, journalist and science writer, Mexico City
Kenneth R. Miller, professor of biology, Brown Univ.
David Morrison, space scientist, NASA Ames Research Center
Richard A. Muller, professor of physics, Univ. of CA, Berkeley
Joe Nickell, senior research fellow, CSI
Jan Willem Nienhuys, mathematician, Waalre, The Netherlands
Lee Nisbet, professor emeritus of philosophy, Medaille College
Matthew C. Nisbet, professor of communication, public policy, and public affairs, Northeastern University, Boston
Steven Novella MD, assistant professor of neurology, Yale Univ. School of Medicine
Bill Nye, science educator and television host, Nye Labs
James E. Oberg, science writer
Paul Offit, physician, author, researcher, professor, Univ. of Pennsylvania
Naomi Oreskes, geologist, science historian, professor, Harvard University
Loren Pankratz, psychologist, Oregon Health Sciences Univ.
Jay M. Pasachoff, Field Memorial Professor of Astronomy and director of the Hopkins Observatory, Williams College
Natalia Pasternak, microbiologist, writer, president, *Instituto Questão de Ciência*, São Paulo, Brazil
John Paulos, mathematician, Temple Univ.
Clifford A. Pickover, scientist, author, editor, IBM T.J. Watson Research Center
Massimo Pigliucci, professor of philosophy, City Univ. of New York–Lehman College
Steven Pinker, cognitive scientist, Harvard Univ.
Massimo Polidoro, science writer, author, executive director of CICAP, Italy
James L Powell, geochemist, author, executive director, National Physical Science Consortium
Anthony R. Pratkanis, professor of psychology, Univ. of California, Santa Cruz
Donald R. Prothero, paleontologist, geologist, author, National History Museum of Los Angeles County
Benjamin Radford, investigator; research fellow, Committee for Skeptical Inquiry
Amardeo Sarma*, chairman, GWUP, Germany
Richard Saunders, Life Member of Australian Skeptics; educator; investigator; podcaster; Sydney, Australia
Joe Schwarcz, director, McGill Office for Science and Society
Eugenie C. Scott*, physical anthropologist, former executive director (retired), National Center for Science Education
Seth Shostak, senior astronomer, SETI Institute, Mountain View, CA
Simon Singh, science writer; broadcaster; UK
Dick Smith, film producer, publisher, Terrey Hills, N.S.W., Australia
Keith E. Stanovich, cognitive psychologist; professor of human development and applied psychology, Univ. of Toronto
Karen Stollznow, linguist; skeptical investigator; writer; podcaster
Jill Cornell Tarter, astronomer, SETI Institute, Mountain View, CA
Carol Tavris, psychologist and author, Los Angeles, CA
David E. Thomas, physicist and mathematician, Socorro, NM
Neil deGrasse Tyson, astrophysicist and director, Hayden Planetarium, New York City
James Underdown, writer, investigator, founder of Center for Inquiry Investigations Group (CFIIG), Los Angeles
Joseph Uscinski, political scientist, University of Miami
Bertha Vazquez, science teacher, director of the Teacher Institute for Evolutionary Science (TIES)
Indre Viskontas, cognitive neuroscientist, tv and podcast host, and opera singer, San Francisco, CA
Marilyn vos Savant, *Parade* magazine contributing editor
Stuart Vyse*, psychologist, professor, author
Mick West, writer, podcaster, investigator, debunker, Folsom, CA
E.O. Wilson, Univ. professor emeritus, organismic and evolutionary biology, Harvard Univ.
Richard Wiseman, psychologist, Univ. of Hertfordshire, England
Benjamin Wolozin, professor, department of pharmacology, Boston Univ. School of Medicine

*Member, CSI Executive Council
(Affiliations given for identification only.)

The Skeptical Inquirer (ISSN 0194-6730) is published bimonthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.:716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.org.

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, Skeptical Inquirer, email: kendrickfrazier@comcast.net. Mail: 944 Deer Drive NE, Albuquerque, NM 87122. Please consult our Guide for Authors for style, reference, and submittal instructions. It is on our website at www.skepticalinquirer.org/article-submission-guidelines/.

Articles, reports, reviews, and letters published in the Skeptical Inquirer represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSI or its members unless so stated.

Copyright ©2021 by the Center for Inquiry and the Committee for Skeptical Inquiry. All rights reserved.

Subscriptions and changes of address should be addressed to: Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

Postmaster: Send changes of address to Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703.

cfi A PROGRAM OF CENTER FOR INQUIRY

Skeptical Inquirer January/February 2022 | Volume 46 No. 1

FEATURES

34
Schrödinger's Bin Laden: The Irrational World of Motivated Reasoning

The rationale behind even seemingly reasoned decisions is often something subconsciously emotional and ideological—with harmful implications for our collective wellbeing.

DAVID ROBERT GRIMES

39
Teach Skills, Not Facts

If the purpose of general education science is to teach students science literacy and critical thinking, why do most courses teach content? Is there a better way?

MELANIE TRECEK-KING

43
Honing Your BS Detector: Conspiracy Theories and the SLAP Test

After reviewing fifty years of legend, rumor, and conspiracy theory research, a folklorist proposes a simple test to help someone quickly assess how much they should trust a story.

JEANNIE BANKS THOMAS

46
Creating a Monster: The Case of Eachy

Could a false article on Wikipedia generate reports of an actual monster? After one ecologist undertook such an experiment, the fictional monster "Eachy" appeared in books, on clothing, and in tourism literature.

CHARLES G.M. PAXTON

49
Searching for Satan in 2021: An Update on Satanic Ritual Abuse Claims

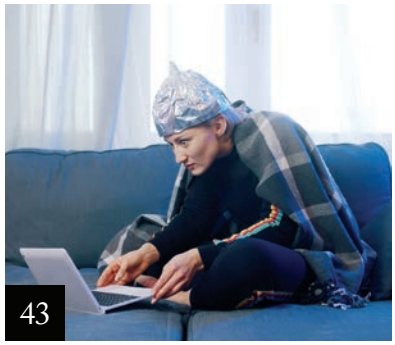
EMMA LOUISE RODGERS ROMERO

53
Is SETI a Failure of Skepticism?

LEONARD TRAMIEL

57
Creationist Funhouse, The Final Episode: No Rest for God

STANLEY RICE



SPECIAL REPORT

10
Sodom Meteor Strike Claims Should Be Taken with a Pillar of Salt

MARK BOSLOUGH

COLUMNS

FROM THE EDITOR
Toilers in the Fields of Human Misunderstanding 4

NEWS AND COMMENT
Anti-Vaccination Mob Assaults COVID-19 Nurses / Science Historian Naomi Oreskes: Science Doing Fine; Rejection Is Due to Ideology, Not Distrust / 'Dawkins Effect'? Celebrity Scientists and Evolution Acceptance / Richard Dawkins Award Presented to Tim Minchin / Lewis Jones, Skeptic and Inventor of Magic, Dies at 96 / Afghan Rescue Fund Saves Lives 5

INVESTIGATIVE FILES
Hidden in Plain Sight: Discovering the Bigfoot Bear
JOE NICKELL 15

NOTES ON A STRANGE WORLD
The Elusive Yorkshire Ripper: A Case of Confirmation Bias
MASSIMO POLIDORO 17

THE PHILOSOPHER'S CORNER
Science Denialism Is a Form of Pseudoscience
MASSIMO PIGLIUCCI 19

REALITY IS THE BEST MEDICINE
The Science (and Pseudoscience) of Aging
HARRIET HALL 21

BEHAVIOR & BELIEF
Why Your Uncle Isn't Going to Get Vaccinated
STUART VYSE 24

THE PRACTICAL SKEPTIC
Jeopardy! and Ideas of Reference
MICK WEST 30

SKEPTICAL INQUIREE
Secrets of Psychic Surgery
BENJAMIN RADFORD 32

NEW AND NOTABLE BOOKS 65

LETTERS TO THE EDITOR 65

REVIEWS

John of God: The Many Crimes of a Spiritual Fraud
BENJAMIN RADFORD 61
John of God: The Crimes of a Spiritual Healer
directed by Mauricio Dias and Tatiana Villela

Are New Gender Beliefs Based on Science and Research?
PETER HUSTON 63
The End of Gender: Debunking Myths about Sex and Identity in our Society
by Debra Soh

Committee for Skeptical Inquiry
"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

Toilers in the Fields of Human Misunderstanding

Why do facts and evidence so seldom sway people from deeply held ideas? It is because we have armament to prevent that from happening. Over the past decade, our pages have been filled with mentions of this problem. In this issue, David Robert Grimes takes a deep dive into the psychological concept that explains it: motivated reasoning—an inherently biased form of decision-making in which instead of evaluating evidence dispassionately, we interpret evidence only to affirm a preexisting belief. As he says, "It demands impossibly stringent standards for any evidence contrary to one's beliefs, while accepting uncritically even the flimsiest evidence for any ideas that suit one's needs." While it has long been part of the human condition, we have seen the ills of motivated reasoning burst onto the public scene in recent years. It explains so much of the discord and disconnection from reality we witness in public discourse.

Grimes gets into his topic via Joseph Stalin and Trofim Lysenko in communist Russia. Lysenko captured Stalin's favor by advocating pseudoscientific ideas about how to increase the yield of wheat crops. The view reinforced Marxist doctrine. Scientists with real knowledge of plants were suppressed, persecuted, and tortured; genetics became a taboo topic; the whole affair set back Soviet biology for decades. Lysenkoism has long been cited as a pernicious example of what can happen when a political regime embraces a pseudoscientific concept. Grimes reveals it as an equally egregious example of motivated reasoning gone wild. But it is not just for the pages of history. Opposition to climate science uses the same processes, and all manner of irrational beliefs today get accepted because they fit personal, religious, or ideological views. Yet, as Grimes notes, "Reality doesn't care one iota for what we believe." The question is: Do we care one iota about reality? We had better.

In her marvelous 2020 book and television series *Cosmos: Possible Worlds*, Ann Druyan devoted chapter (and episode) four to the tragic story of Nikolay Vavilov, the courageous scientist who was the primary target and victim of Lysenko's pseudoscience. It is both an inspiring and heartbreaking story, one she told me she had long wanted to tell.

Melanie Trecek-King is a college biology teacher who discovered that teaching the processes of science and critical thinking is far more effective than focusing just on facts. In "Teach Skills, Not Facts," she shows how she uses real-world issues relevant to students to help them evaluate claims. Likewise, Jeannie Banks Thomas, a folklorist and professor, discovered that even her own studies of legends and rumors didn't make her immune to forwarding an online rumor. She proposes a "SLAP Test" to activate our BS detectors and "help us process the fire hose of misinformation that is today's internet."

Grimes, Trecek-King, and Thomas, like our other authors, are toilers in the fertile fields of human understanding and misunderstanding. They seek to recognize our irrationalities and find novel ways for us to overcome them to be better critical thinkers. More power to them.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Alexander Nicaise
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Robyn E. Blumner, Harriet Hall, Ray Hyman, Barry Karr, Elizabeth Loftus, Joe Nickell, Amardeo Sarma, Eugenie C. Scott, David E. Thomas, Leonard Tramiel, Stuart Vyse

CONTRIBUTING EDITORS Harriet Hall, David Morrison, Joe Nickell, Matthew C. Nisbet, Massimo Polidoro, David E. Thomas, Stuart Vyse, Mick West, Richard Wiseman

Published in association with
CENTER FOR INQUIRY

CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR OF DEVELOPMENT Connie Skingel
DIRECTOR OF MARKETING Cameron Popp
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR OF GOVERNMENT AFFAIRS Azhar Majeed
DIRECTOR OF EDUCATION; DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez
SYSTEM ADMINISTRATOR Cody Hashman

BOARD OF DIRECTORS Edward Tabash (chair), Vinod Bhardwaj, David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Bill Maxwell, Y. Sherry Sheng, Julia Sweeney, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary:* Rebecca Newberger Goldstein, Susan Jacoby

STAFF Melissa Braun, Matthew Cravatta, Roe Giambrone, Aaron Green, Cynthia Kazaroff, Paul Paulin, Michael Powell, Vance Vigrass, Shaun White

Original cover art for SI by Howard McWilliam

cfi CENTER FOR INQUIRY
CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

Anti-Vaccination Mob Assaults COVID-19 Nurses

Benjamin Radford

Editorial credit: rokosvisualvibes / Shutterstock.com

In early October 2021, a mob of several hundred people attacked nurses providing COVID-19 vaccinations and held them hostage. Though details are sparse, the incident happened in the rural Guatemalan village of Maguilá in Alta Verapaz province near Quetzaltenango. One vehicle was rendered inoperable through vandalism, and a cooler used to keep the vaccines effective in the tropical heat was destroyed, resulting in the loss of about fifty doses. A BBC News article quoted a nurse as saying, "We tried to explain a number of times that vaccination is voluntary and that we did not want to force anyone, yet they didn't let us [work]." The team was released after about seven hours of negotiations with police.

Gabriel Sandoval, director of the provincial health department, noted that vaccination reluctance isn't new, but this was an escalation from the typical latent hesitancy: "Other communities have refused, but what they usually do is draw up papers saying we went to offer to vaccinate them, and they take responsibility for refusing it," he was quoted as saying by the Associated Press. Sandoval added that because of the misinformation about vaccines and distrust of doctors in the region—and on social media specifically—"This was bound to happen." President Alejandro Giammattei responded to the incident by asking Guatemalans to support and respect public health officials. Only about one in four eligible Guatemalans have been fully vaccinated, very low even by Latin American standards, where the pandemic has put added pressure on an already weak public health infrastructure.

Distrust of authorities—and North American medical authorities in particular—is nothing new. In 2013, gunmen attacked two medical clinics, killing nine polio immunization workers in northern Nigeria. Dozens of polio vaccination workers in Pakistan have been attacked and murdered over the past decade. Much of the violence there has been targeted by the Taliban at health workers because conspiracy theories, urban legends, and rumors have spread throughout the region.

The Guatemalan protest was spurred by a local villager who had developed side effects from the COVID-19 vaccination, which are expected, temporary, and mild. And it's happened before. In a small town in rural Colombia, teen girls complained about strange symptoms in 2014. Though no official cause was determined, villagers placed the blame squarely on a vaccination campaign. According to Latin America–based Telesurv, "At least 276 girls have been reported sick in the Caribbean coastal town, after receiving the Gardasil vaccine in the last several months. The girls, ranging from nine to sixteen, all experienced the similar symptoms including dizziness, fainting, headaches, numbness and tingling throughout their bodies."

It's not hard to understand why the HPV vaccine was blamed. For one thing, the vaccination was a common factor among the victims, who were all school-aged females. It's a classic example of a logical fallacy *post hoc ergo propter hoc* ("after this, therefore because of this"). People tend to assume that if one event follows another event, there must be some causal link between the two: The girls began having strange symptoms after they got the vaccine,

and therefore the vaccine caused the symptoms. But that's not necessarily true; there could have been any number of other factors.

Conspiracy theorist Alex Jones wasted no time in playing up the Colombian story, along with other examples, including a 2008 case where homeless people in Poland may have died from bird flu vaccinations. Never mind that these were completely different vaccines given to different populations on different continents six years apart—and that the symptoms were completely different: "This week I saw vaccine deaths in Pakistan, in Syria, and now in Colombia. … They say, 'We take the shots, and the little girls start dying,'" Jones stated in a September 20 video. Jones was apparently unaware that the girls were vaccinated nearly half a year earlier and that the ailments (dizziness, headaches, numbness, etc.) fell somewhat short of "dying."

Because the HPV vaccination cannot cause the symptoms described (and certainly not months after being administered) and no other agents or toxins were found, the most likely cause is mass sociogenic illness, better known as mass hysteria. It happens when psychological symptoms are converted into physical conditions. The girls were neither faking nor imagining the physical symptoms; they really did experience headaches, nausea, occasional fainting, and so on. But the problems were not caused by any external substance or contaminant; the cause was social and psychological. Parents of the Colombian girls angrily (and understandably) rejected the diagnosis, instead accusing the local authorities of incompetence or even conspiracy. Public health officials feared that if others accepted the HPV vaccine explanation, parents would refuse to vaccinate their children. Ironically, rumors and conspiracy theories blaming vaccines cause far more lasting damage than the vaccines themselves.

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

Science Historian Naomi Oreskes: Science Doing Fine; Rejection Is Due to Ideology, Not Distrust

Kendrick Frazier

Science is alive and thriving, thank you, and so assertions of its impending demise are noticeably premature. Yes, there are major issues in which people shun findings of science that conflict with their beliefs, but to deal with that problem we first have to properly diagnose it.

Those were the two key themes of science historian and geologist (and CSI Fellow) Naomi Oreskes of Harvard University in her October 28, 2021, online Skeptical Inquirer Presents talk. Oreskes is lead author of *Merchants of Doubt* (which has sold 100,000 copies) and author of other books such as *Why Trust Science?* and *Plate Tectonics: An Insider's History of the Modern Theory of the Earth.*

"Science is doing well," she said. "How can I say that?" The quick creation of vaccines "with astonishing levels of efficacy" against COVID-19 is clearly a sign "that our scientific enterprise is working well."

The data also show the same thing. General Social Survey polls consistently show that Americans still trust science and scientists. In the latest polls, only the military is more trusted than science. Some 71 percent of Americans support government funding of research, and 72 percent support government funding of engineering and technology.

And this trust in science is global.

"Any claim that there is a crisis in science in recent years is not supported by evidence," Oreskes said. "And I know this is a very evidence-based group."

"So, what the heck is going on?" she asked. "Why is there this impression that there's this distrust in science?"

One answer is the media narrative. She showed several articles written about "a crisis in science." They were not from general newspapers or magazines but from scientific journals and science magazines. So, scientists themselves are pushing the idea.

"We need to go with the collective evidence, not just the narrative," she said.

One thing we know for sure, though, is that there is a tremendous political polarization in attitudes toward science. People on the left side of the political spectrum trust science much more than do people on the right side. Trust in the military is flipped, left and right. And that's not just in the United States. "We see the same in other countries," she said.

"So why are people on the right rejecting vaccines? Vaccines don't care

whether you are Republican or Democrat."

"Most people don't reject science across the board. They selectively reject science in specific areas … or they reject the implications. It implies something they don't like, emotionally or intellectually."

She analyzed this "implicatory denial" in three areas: evolutionary biology, climate change, and mask mandates.

Opposition to evolution depends a lot on nuances of wording. "Something is going on that has to do not with evolutionary theory but with how we feel about God or some additional power in our lives."

There is a remedy, she said: Acknowledge that God is not a scientific question.

In fact, scientists would do well in discussing evolution with the public to emphasize three limitations:

1) Science does not disprove the existence of God.

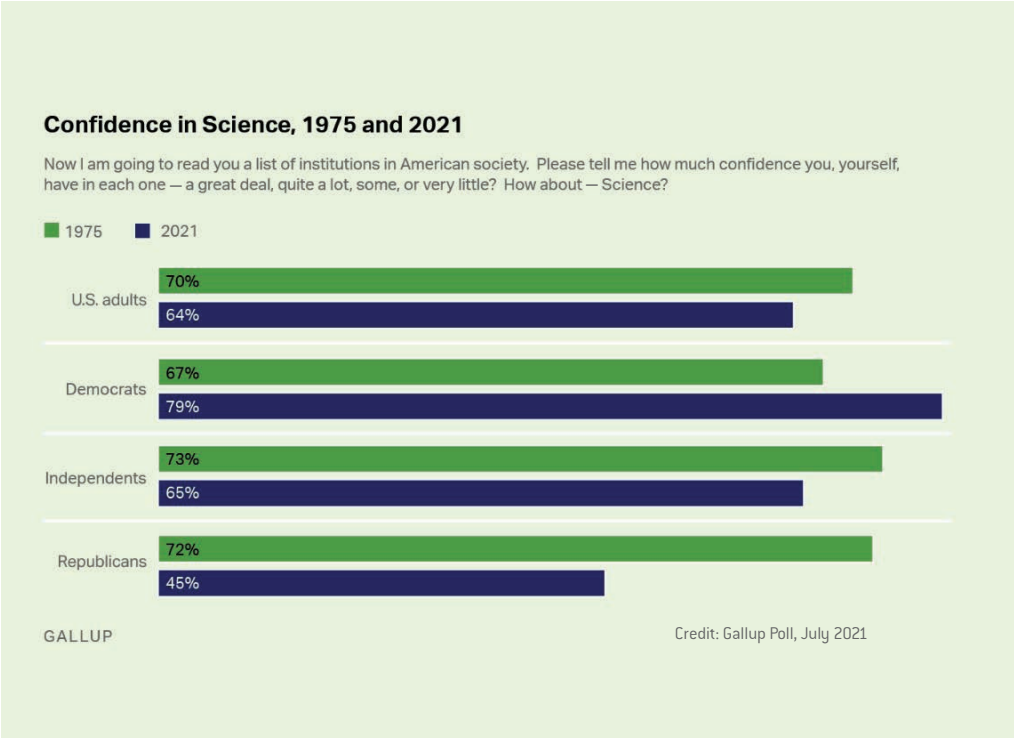
2) Science does not tell us the meaning of life.

3) Science does not tell us that people are "mistakes" (a claim sometimes heard from religious-based evolution opponents).

As for climate change, many scientists think mistakenly that resistance is driven by uncertainty; however, "That's a misdiagnosis." Eighty-eight percent of Democrats think climate change is a threat, but only 31 percent of Republicans do. "So, something else is going on; it's not a matter of scientific facts."

Political polarization about climate change began around 1990 and has steadily worsened since then. As she showed in *Merchants of Doubt*, the major factor explaining that is ideology. It is "market fundamentalism, fear of government regulation of business," plus the assertion that regulation is a gateway to communism (an argument still used today). This was all part of Cold War anxieties. The whole anti–climate science agenda was pushed strongly by fossil fuel interests.

Of course, there is hypocrisy and "misdirection" in that regard, she pointed out: Fossil fuels are heavily subsidized by governments. In fact, she noted that fossil fuels are the second most heavily subsidized industry, after agriculture. Studies a few years back showed that the world spends $5 trillion on energy subsidies, and that figure now is up to $7 trillion.



Mask mandates align with radical individualism. They align with conservative ideology, with fear of big government. It is "standing up for freedom" and "not wanting to be told what to do."

"It is not driven by lack of trust in science. It is driven by personal, ideological, theological, and political concerns and frameworks."

So, she asked, what does this mean for those of us concerned about science? We need to remember four things:

1) The vast majority of Americans *do* trust science.

2) Facts do count to most who do trust science.

3) Scientists need to provide good quality information in formats the public can understand.

4) With those motivated by nonempirical concerns, outreach must acknowledge their concerns.

Scientists, as much as possible, need to communicate findings without telling people what to do. "I don't like being told what to do," she acknowledged, so she can understand why others don't. "Let people figure out for themselves what to do with that information, as much as possible."

Her take-home points? Not to be afraid to talk about these issues. Think about who the audience is. Don't just start talking. Acknowledge their concerns. Communicate in a nonaggressive way.

Oreskes got vaccinated in Provo, Utah, a conservative region, last spring. The health workers had arranged for recipients to write messages about why they got the vaccine. Some of them were very moving, recalling relatives lost to COVID-19.

She especially liked one message: "I protect my family in many ways. Why not this?"

Kendrick Frazier is the editor of the SKEPTICAL INQUIRER.

'Dawkins Effect'? Celebrity Scientists and Evolution Acceptance

Kendrick Frazier

Can famous celebrity scientists help shape the public's view on evolution? And how do public perceptions about them change that?

In today's media-saturated world, the public often comes to understand scientific ideas through how they are embodied by famous individuals. Declan Fahy wrote about that in his 2015 book *The New Celebrity Scientists* and in his related cover article in the Skeptical Inquirer, "A Brief History of Scientific Celebrity" (July/August 2015).

Now two researchers in the Department of Science and Technology Studies at University College London have published a detailed study of how the four best-known celebrity scientists in Britain—David Attenborough, Brian Cox, Richard Dawkins, and Stephen Hawking—influence the understanding of popular science, in particular evolution.

Amy Unsworth and David Voas analyzed whether familiarity with these four celebrity scientists (plus two creationists, Ken Ham and Harun Yahya) changes acceptance of evolutionary theory among members of the public, both religious and nonreligious.

They tested predictions from social identity theory that celebrity scientists known for their positions in the science-religion conflict would exert different effects on audiences—specifically that they would promote increased acceptance of evolution among nonreligious groups and decreased acceptance of evolution among religious groups.

They began with Fahy's concept of celebrity scientists and noted that among the four most influential in Britain, three (Attenborough, Cox, and Dawkins) had worked to popularize evolutionary theory through their popular science books and television appearances. All four have stated they do not believe in a deity, but they all have presented slightly different approaches about that to the public. Dawkins and Hawking believe science and religion are in opposition, while Attenborough and Cox tend to say little publicly about religion.

The researchers commissioned a polling company to conduct a survey of the British population in August 2014, gathering a nationally representative sample, including people from five different religious traditions. (This survey period was of course while Stephen Hawking was still alive.)

Respondents reported they had learned about evolution mostly through science/nature programs on television, followed by "studied at school." Books, newspaper or magazine articles, and conversations with friends and family came in next. "These results," the researchers say, "point to the importance of popular science media in informing people's ideas about evolution."

"These results," the researchers say, "point to the importance of popular science media in informing people's ideas about evolution."

The four celebrity scientists analyzed in their paper were in general well known to the respondents. Hawking was associated with science by 93 percent, Attenborough by 79 percent, Cox by 72 percent, and Dawkins by 49 percent.

One of their questions was to what extent people trusted each to present reliable information about science. Among the nonreligious (who now represent 53 percent of Britain's population, according to 2017 social survey data), as well as Anglicans and Catholics, there was high trust in Attenborough, Hawkins, and Cox, with about 90 percent agreeing. The chart for Dawkins looked a bit different. About 78 percent of nonreligious people thought he presented reliable science information. But his trust levels were in the 40 to 50 percent range for Anglicans, Catholics, and Muslims and only 19.8 percent and 25.1 percent among independent evangelicals and Pentecostals, respectively.

The survey showed that many more people perceived Dawkins as viewing religion negatively compared to any other celebrity scientist.

The researchers were particularly interested in respondents who reported a change in view about evolution, either more or less accepting.

For the nonreligious, associating Dawkins with science increased the odds of becoming more accepting of evolution. This was also true among Catholics. The other celebrity scientists showed no significant positive effect.

But among religious people, especially Muslims and Pentecostal Christians, those familiar with Dawkins as both a scientist and as someone who holds negative views about religion are more likely to become less accepting of evolution.

As Unsworth and Voas report in the journal *Public Understanding of Science* ("The Dawkins Effect? Celebrity Scientists, (Non)religious Publics and Changed Attitudes to Evolution," vol. 30 issue 4, pages 434–454, 2021), "Among non-religious publics Dawkins was the only celebrity scientist associated with higher odds of becoming more accepting of evolution."

But given the opposite effect among those who are religious, they advise, "We suggest that engaging certain religious audiences with the science of evolutionary biology may be more effective when their religious identities are not threatened."

Richard Dawkins Award Presented to Tim Minchin

Tim Minchin has delighted and enlightened audiences around the world with his music and comedy. For two decades, he has used his remarkable talents to not only entertain but to open minds to the wonders of science, open hearts to the power of compassion, and expose the folly of pseudoscience and superstition.

For inspiring millions with the light of reason, Tim Minchin is the recipient of the 2021 Richard Dawkins Award, presented by the Center for Inquiry. Minchin received the award from Richard Dawkins himself in a sold-out event October 10, 2021, at the Sheldonian in Oxford, England.

"Tim's music not only delights his legions of atheist admirers; it also opens the hearts and minds of fans around the world to the beauty and power of science and reason," said Dawkins. "His incredible body of work is about much more than opposing religion and pseudoscience, but whether he's singing songs, telling jokes, or composing hit musicals, his love for learning, his devotion to the truth, and his hope for humanity always shine through."

Lewis Jones, Skeptic and Inventor of Magic, Dies at 96

Mike Hutchinson

Lewis Jones died on September 9, 2021. He would have been ninety-seven in November. He will be best known by skeptics for writing eighty-four articles for his column "Inklings" in the Committee for Skeptical Inquiry newsletter, *Skeptical Briefs*. I first met Lewis in 1980 when I represented Prometheus Books in Europe. Lewis telephoned me to order *The Psychology of the Psychic* and *ESP and Parapsychology*. During our long conversation, it transpired that we had much in common, not only as skeptics but also an interest in magic. Lewis was a prolific inventor of magic and published many books on card tricks, including *Encyclopedia of Impromptu Card Forces*, *Ahead of the Pack*, and *Seventh Heaven*, the latter being a collection of the best effects of his first seven books. Now out of print, *Seventh Heaven* is still in great demand by magicians. His effects included cards, coins, business cards, and calendars; see lewisjonesmagic.co.uk for plaudits given him by magicians. Before he died, Lewis had arranged for many of his books to be republished by an American company. An announcement about this will be posted to his website soon.

In Paul Daniels's BBC magic show broadcast on February 22, 1992, Daniels and Debbie McGee presented a mind reading effect that Lewis had published in *Person to Person: A Book of Telephone Telepathy*. It was only when watching the show that he knew his effect was being used. Lewis's effect, called "Pattern Principle," formed part of the trick that Rick Lax used to fool Penn and Teller on their television show *Fool Us*.

Lewis had an interesting and successful life. He studied modern languages at Cambridge University. For a short time, he was a teacher at Summerhill School, which describes itself as "the oldest children's democracy in the world. It is probably the most famous alternative or 'free' school."

After leaving Cambridge, he immediately began writing radio drama and short stories for the BBC. He then spent ten years in Singapore as a presenter, producer, and news reader for national radio and is now an honorary member of Singapore's IBM Ring 115 (the Great Wong Ring). He was eventually thrown out of Singapore for interviewing someone who the first prime minister, Lee Kwan Yew, disapproved of.

The good thing about his stay in Singapore is that he met his delightful wife, Sush Devi, who came to England with him and played lead violin for the English National Opera. Lewis too was a musician, playing piano. He arranged a selection of Beatles' songs and other works for Devi's string quartet, which they played at many venues, including the Purcell Room on London's South Bank. Settling in London, Lewis initially wrote school radio scripts for the BBC but later became an editor for both Longman and Collins publishers. Lewis is survived by his wife; his daughter, Lynne; son, Dale; three grandsons; and seven great-grandchildren.

Mike Hutchinson has been associated with CSI since its beginning in 1976. He represented Prometheus Books in Europe until 1998 and is currently the European subscription representative for Skeptical Inquirer. He is the coauthor of the skeptical book *Bizarre Beliefs* and was twice sued for libel by Uri Geller.

Afghan Rescue Fund Saves Lives

In early September 2021, the Center for Inquiry (CFI) announced an initiative to respond to the humanitarian catastrophe that was unfolding in Afghanistan: the Afghan Rescue Fund. Coordinating with David Cowan, a CFI board member and producer of the documentary film *Afghan Dreamers*, CFI asked the secular and skeptic communities to help with the safe relocation of Afghan families endangered by the collapse of the government and the oppression of a theocratic regime.

Richard Dawkins, a CFI board member, asked us to "look beyond our national identities and embrace the opportunity to help our fellow human beings. An entire nation collapsing under the weight of theocratic oppression is a moral emergency. … Our community will answer that call."

And you did. And you are.

We at CFI can't risk giving too many details about the people who have been rescued, relocated, and given assistance, but we are very proud to say that dozens of Afghan refugees have been helped as a direct result of the Afghan Rescue Fund and the generosity of this community.

SPECIAL REPORT]

Sodom Meteor Strike Claims Should Be Taken with a Pillar of Salt

A controversial, widely publicized paper claiming that a cosmic impact destroyed a biblical city has had key images photoshopped and rotated to fit the biblical hypothesis.

MARK BOSLOUGH

On September 20, 2021, the open access journal *Scientific Reports* posted a paper titled "A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley Near the Dead Sea" (Bunch et al. 2021). The paper cited the Bible as possibly containing a written record of the destruction: "We consider whether oral traditions about the destruction of this urban city by a cosmic object might be the source of the written version of Sodom in Genesis."

The paper's team, led by Ted Bunch of Northern Arizona University, had twenty-one authors, most of whom are credible scientists from respected institutions. Most are also proponents of a controver-

sial hypothesis that an impact or airburst was responsible for a mass extinction of North American mammals and abrupt climate change at the Younger Dryas boundary 12,900 years ago.

The story was pitched by one author's institutional news organization's publication, *The Current* of UC Santa Barbara, which played up the Sodom connection with the title "Researchers Present Evidence That a Cosmic Impact Destroyed a Biblical City in the Jordan Valley." A subsection titled "Fire and Brimstone" helpfully reminded us that Lot's wife was, according to the Bible, turned into a pillar of salt.

This formula could not have worked better. Within a day it had generated worldwide coverage by media ranging from internet clickbait to *Newsweek*, *National Review*, and *Forbes*. Within a week, the online data tracker Altmetric showed that it had been accessed 242,000 times, putting it in the 99.98 percentile of tracked articles of similar age in all journals. One of the paper's authors, on his blog, declared, "For the time being, arguably, its [*sic*] the most read scientific paper on earth."

When the paper dropped into my inbox on the day of publication, one sentence in the abstract stood out: "Tunguska-scale airbursts can devastate entire cities/regions and thus, pose a severe modern-day hazard." Because this is my area of expertise and has been the subject of my research for decades, I thought I'd better give the paper a thorough read. I posted comment threads on Twitter as I went, which caught the attention of other scientists and skeptics. Together we quickly made a disturbing discovery: Images from the Tall el-Hammam excavation had been photoshopped and rotated to match the hypothetical compass direction of the supposed blast.

As I was entering the new field of planetary impact hazards in 1994, physicist and CSI Fellow Robert Park was the lead author of a book chapter that asked, "Can Defense against Asteroids Be Sustained?" Park pointed out that our community must overcome the "giggle factor" to persuade leaders to take the hazard seriously, and scientists should focus on public education. Fearmongering may sell newspapers with headlines such as "doomsday rock" and "killer comet," but that only undermines the credibility of the scientific community on this issue.

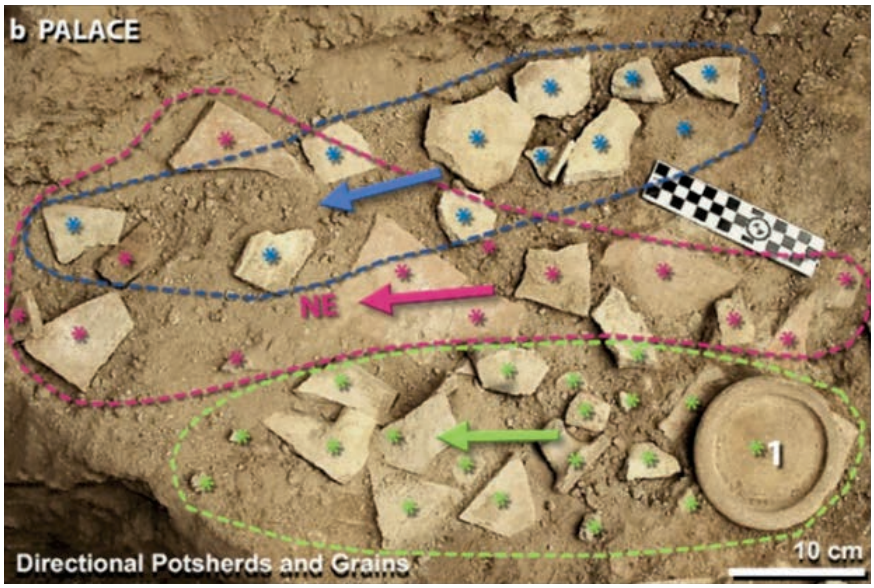


Figure 15b as published by Bunch et al. (2021). Bunch et al. supported their claim of a blast directed to the NE by adding NE arrow annotation, but it contradicts the north arrow they cropped out.

Fortunately, there are organizations such as Asteroid Day and the B612 Foundation that are focused on facts, public education, outreach, and research. But a recently created Comet Research Group (CRG) has discovered that fearmongering is an effective fundraising tool for their fringe investigations despite its potential damage to the credibility of serious scientists engaged in planetary defense.

The CRG Indiegogo page says:

> Killer Comets are Coming … Killer comets are a threat to Earth's cities. Help do something about them … Killer comets are more common than you've been taught. Our mission is to prove it and to do something about it before your city is next … We are in serious danger, but with your help we can do something about it.

CRG is not engaged in planetary defense but was nevertheless able to raise over $35,000 for expeditions to "look for comet fragments," including a "Fire from the Sky Expedition" to the Middle East. This probably refers to the Tall el-Hammam Excavation Project (TeHEP) a joint undertaking between Trinity Southwest University (TSU) and Veritas International University (VIU). Seven members of CRG and coauthors of Bunch et al. (2021) traveled to Jordon to participate in a TeHEP dig, apparently to look for comet fragments as part of their mission to prove that killer comets are more common than you've been taught.

TSU is an unaccredited evangelical Christian institution located in an Albuquerque, New Mexico, strip mall. Part of its mission statement is "to uphold the divine authority of the Bible as God's only inspired representation of reality to humankind."

VIU (formerly Veritas Evangelical Seminary) is a Christian institution in a Santa Ana, California, office park. It is dedicated to biblical inerrancy, the belief that the Bible is without error. The VIU website states:

> Inerrancy simply cannot be rejected without grave consequences, both to the individual and to the Church … This inerrancy isn't just in passages that speak about salvation, but also applies to all historical and scientific statements as well. It is not only accurate in matters related to faith and practice, but it is accurate and without error regarding any statement, period.

The agendas of the organizations that

lead TeHEP are not hidden from sponsors or amateur excavation volunteers; indeed, the GoFundMe page asks potential donors to consider giving money to their "Dig Sodom" project to "help us prove the veracity of the Bible."

The chief archaeologist and director of TeHEP is Steven Collins, whose CV is posted online. It shows that he has served as executive dean of TSU since 1990, the same institution that granted his PhD in Archaeology and Biblical History in 1997. He is also director of the PhD program in Archaeology and Biblical History at VIU.

Collins conceived the notion that Tall el-Hammam is the biblical Sodom and was destroyed by an airburst from an incoming object from space. In 2014, he told *Popular Archaeology*, "We now have a slew of research scientists who specialize in this kind of thing working on samples from Hammam at several major university labs across the country. The interest that our 'airburst' is generating is quite amazing." But according to the article's author, "scholarly consensus on this remains elusive, to say the least." It is not clear why Collins, who came up with the idea and directed the dig, was not a coauthor of the Bunch et al. paper.

The CRG is registered to Rising Light Group, a tax-exempt organization with a website that links to religious sources, including *Biblical Archaeology Review*, where it features a splash page showing Jesus's crucifixion. Rising Light is registered to Allen West, who is also cofounder and director of CRG.

West's background is a puzzle because of his lack of a published CV. According to the group's blogger (listed as another cofounder and director of CRG) in response to questions about West's background, "Allen never claimed he was any more credentialed than he was—the first time I spoke with him he claimed only a philosophy doctorate from an obscure school in Nebraska." West was quoted in a widely circulated email with more information:

> I don't have a doctorate in science; I was trained in geophysics while on the job, and worked for most of my career as a geophysical consultant. I also owned a licensed Texas consulting company for the oil-and-gas business. … I do have a doctorate in philosophy from a Bible college in Nebraska.

The earliest appearance of Allen West in my Google searches is 2006, related to a book he coauthored with nuclear chemist Richard Firestone titled *Cycle of Cosmic Catastrophes: How a Stone-Age Comet Changed the Course of World Culture*.

West, like Collins, has a knack for coming up with ideas that get explosive media coverage but are met with scientific skepticism from subject matter experts. According to CSI Fellow David Morrison ("Did a Cosmic Impact Kill the Mammoths?" SI, May/June 2010), "This book develops Firestone's 2001 suggestion that a cosmic ray catastrophe, probably caused by a supernova, occurred in northeastern North America in the late Pleistocene."

For a self-taught scientist, West has demonstrated an exceptional gift for finding evidence that trained geologists miss when doing field work and for being able to tease out information that trained analysts fail to see in the lab. At the May 2007 American Geophysical Union Joint Assembly in Acapulco, West joined his coauthor Firestone at a press conference to announce the discovery of evidence that a giant comet impact or airburst wiped out the Clovis culture and led to the extinction of megafauna across North America, including woolly mammoths.

A reporter asked, "Why is this the first we've heard of this?" According to Firestone, the work stopped after 2001 because "we didn't have enough information." But all that changed around 2004 when "Allen got involved." He continued, "Allen was our field man and got out there and took all the samples and dug in the dirt and figured out how to find a lot. … Allen got a lot of the samples that we have studied and has figured out not only how to analyze these samples but how to understand these samples."

That was only the beginning of West's rapid and remarkable rise to fame. While working alone in a Calgary fossil warehouse he was visiting for the filming of the National Geographic documentary *Mammoth Mystery* (broadcast in October 2007), he found mammoth tusks with embedded micrometeorites he'd predicted and attributed to the cosmic explosion he'd proposed.

The following year, he announced the discovery of nanodiamonds as confirming evidence for a continent-wide impact event. Later that year, he was invited to participate in a PBS *NOVA* episode on his discoveries, "Megabeasts' Sudden Death," in which the narrator described West's unique scientific prowess as he was shown on screen with a rock hammer collecting samples and then shipping them to analytical labs: "In the past three years, West has dug into his retirement savings, shipping boxes of dirt to colleagues around the world, trying to solve the mystery. West has become his very own FedEx hub of Ice Age dirt."

NOVA flew two glacier experts to Greenland to look for evidence of an impact in the ice layer from that time. The researchers emphasized how unlikely it would be to find the exact layer but collected samples they hoped were the right age and sent them to West to prepare.

NOVA narrator:

> Now it comes down to the nanodiamonds, which are also the hardest to process. Searching through samples from a seventeen-meter trench for evidence that is a million times smaller than a grain of sand is a very, very painstaking process. That job fell to Allen West. … The meticulous work is finally done, and West has managed to prepare samples for the transmission electron microscope.

In the climactic scene, the team sees hexagonal nanodiamonds on the screen, bringing one of them to tears. West had hit another one out of the park on his very first swing. That was in 2008. As of 2021, this discovery has never been replicated, even by the same group.

West's other claims also unraveled as skeptical scientists published papers showing that some of his diamonds were actually graphene, carbon spherules were actually fungus and bug poop, there weren't significant concentrations of other

One of seven sets of original and altered images uploaded to PubPear by Allen West in response to criticisms. We know from other images that the red object at the bottom of the original is a north arrow that points to ten o'clock.

claimed impact markers, and samples that were supposed to be 12,900 years old contained modern carbon.

In 2011, science journalist Rex Dalton published a stunning revelation:

> The team's established scientists are so wedded to the theory they have opted to ignore the fact their colleague "Allen West" isn't exactly who he says he is. West is Allen Whitt—who, in 2002, was fined by California and convicted for masquerading as a state-licensed geologist when he charged small-town officials fat fees for water studies. (Dalton 2011)

For many of us, that was the end of the story. We no longer trusted any data that West had handled. For me, it was like looking at the Necker cube illusion and never being able to see it the old way again. When *NOVA* found out, they pulled the plug on "Megabeasts." But most of his coauthors either didn't care or circled the wagons and kept publishing with him, even growing their collaborations to include biblical archaeologists excavating ruins in the Middle East, leading to the Sodom airburst paper.

One longtime collaborator, Christopher Moore, was the lead author of an article published on the day of the paper's release in *The Conversation* ("Academic rigor, journalistic flair"), titled "A Giant Space Rock Demolished an Ancient Middle Eastern City and Everyone in It—Possibly Inspiring the Biblical Story of Sodom" (Moore et al. 2021).

One commenter quoted Rex Dalton's article about West's conviction. West responded with the claim that "there was no conviction and no fraud then or now" because he was able to get it expunged from his criminal record. In fact, the motion for expungement included West's sworn statement under penalty of perjury that said, "On March 4, 2002, I was convicted in the Superior Court of the County of San Bernardino of the charge of violation of Business and Professional Code section 17500." Expungements do not change history.

One of the first things I noticed in the Sodom paper was that the authors had completely misunderstood or misrepresented my airburst models. As I dug further, I discovered that it was deeply flawed in many other ways. Because of my skepticism about West, I sent a link to image forensic specialist Elisabeth Bik, who has recently gotten a lot of attention for her success at identifying scientific misconduct and getting papers retracted (Shen 2020). Bik quickly found repetitive elements in some of the field photographs that indicate digital tampering (Bik 2021). Her discovery was immediately denied by one coauthor: "The accusation that the image was photoshopped is categorically false." But it was soon confirmed by another author, the blogger, who dismissed it as an inconsequential "Pebblegate" with this explanation: "Our graphic artist made minor, cosmetic corrections to five of fifty-three images."

Finally, West weighed in by revealing earlier versions of seven out of the eighteen photographs taken in the field that had been digitally altered. He showed the images along with the modified versions, claiming, "We altered no crucial data, such as bones and potsherds." But the photos tell a different story. Metadata is crucial data, and four of the seven images had the north arrows used by archaeologists to orient images digitally edited out.

The Sodom airburst hypothesis, to satisfy biblical inerrancy, also required an influx of the salt that turned Lot's wife into a pillar, and for that the explosion needed to be over the northern Dead Sea, which is to the southwest. Dig director Collins, in his June 5, 2020, "Toweling Down Episode 2" video, said, "It came from the southwest. … One of the most important things is the directionality."

With no north arrows, photos can be reoriented, as was clearly done for their figure 44c (see p. 14), which has shadows indicating the sun would be shining from an impossible direction at that latitude in January. Innocent explanations involving mistakes cannot be ruled out, which is why original digital files of the photographs with intact metadata must be provided to independent researchers. Several of my colleagues have requested this information from West, who is corresponding author for this paper.

Nevertheless, these biblically correct

rotations of images satisfy the dictates of all three sponsoring organizations, paraphrased here:

CRG: Our mission is to prove that killer comets are more common than you've been taught.

TSU: The Bible is God's only inspired representation of reality to humankind.

VIU: Biblical inerrancy applies to all historical and scientific statements.

I'm aware of many additional critical comments about this paper by other subject matter experts, including geologists and archaeologists, some of which have already been submitted for publication. The undisclosed and inappropriate digital tampering of images suggests the possibility of similar mishandling of other evidence.

As a longtime contributor to planetary defense, I was the first to suggest that airbursts have an outsized contribution to impact risk and to advocate looking for evidence of prehistoric airbursts in the geologic record. I'm concerned that this paper will contribute to a new "giggle factor" that undermines the credibility of my community. I have coauthored papers about geologic evidence for two airbursts in Egypt. And a new paper has just been published by my colleagues who have discovered evidence for an ancient airburst in Chile (Schultz et al. 2021). Cosmic airbursts are real—and should be taken seriously.

But claims made about a Sodom meteor strike should be taken with a pillar of salt. ■

Figure 44c as published by Bunch et al., which was also photoshopped. Sun angle can be inferred from shadows but contradicts the north arrow annotation added by Bunch et al. to the image taken at Tall el-Hammam latitude in winter. Colored arrows are annotations added by Bunch et al. to point out features in the photograph.

Acknowledgments

This article was written with the help and advice of my valued colleagues David Morrison, Clark Chapman, and Alan Harris to whom I am very grateful.

References

Bik, E. 2021. Blast in the past: Image concerns in paper about comet that might have destroyed Tall el-Hammam. *Science Integrity Digest* (October 1).

Bunch, T.E., et al. 2021. A Tunguska sized airburst destroyed Tall el-Hammam a Middle Bronze Age city in the Jordan Valley near the Dead Sea. *Scientific Reports* 11(1): 1–64.

Dalton, R. 2011. Comet theory comes crashing to Earth. *Pacific Standard* (May 14).

Moore, C.R, et al. 2021. A giant space rock demolished an ancient Middle Eastern city and everyone in it—possibly inspiring the biblical story of Sodom. *The Conversation* (September 20).

Shen, H. 2020. Meet this super-spotter of duplicated images in science papers. *Nature* 581: 132–136. Available online at https://www.nature.com/articles/d41586-020-01363-z.

Schultz, P.H., et al. 2021. Widespread glasses generated by cometary fireballs during the late Pleistocene in the Atacama Desert, Chile. *Geology* (November 2). Available online at https://doi.org/10.1130/G49426.1.

Further Reading

Boslough, M. 2014. Airburst warning and response. *Acta Astronautica* 103: 370–375.

Boslough, M.B.E., and D.A. Crawford. 2008. Low-altitude airbursts and the impact threat. *International Journal of Impact Engineering* 35(12): 1441–1448.

Boslough, M., et al. 2012. Arguments and evidence against a Younger Dryas impact event. In *Climates, Landscapes, and Civilizations*. American Geophysical Union 198: 13–26.

———. 2015. Updated population and risk assessment for airbursts from near-earth objects (NEOs). In *2015 IEEE Aerospace Conference.*

Dalton, R. 2007. Mammoth tusks show up meteorite shower. *Nature*. Available online at https://doi.org/10.1038.

Fernandez, S. 2021. An ancient disaster. *The Current* (UC Santa Barbara) (September 20).

Firestone, R., et al. 2006. *The Cycle of Cosmic Catastrophes: How a Stone-Age Comet Changed the Course of World Culture*. New York, NY: Simon and Schuster.

Firestone, R.B., et al. 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. *Proceedings of the National Academy of Sciences* 104(41): 16016–16021.

Morrison, D. 2010. Did a cosmic impact kill the mammoths? Skeptical Inquirer 34(3): 14–18.

O'Grady, C. 2021. Scientists rally around Elisabeth Bik after accusations of harassment and blackmail. *Science* 372: 1021–22.

Park, R.L., et al. 1994. The lesson of Grand Forks: Can a defense against asteroids be sustained? In *Hazards Due to Comets and Asteroids*. Tucson, AZ: University of Arizona Press, 1225–1230.

Singer, N. 2007. Sandia supercomputers offer new explanation of Tunguska disaster. Sandia National Laboratories news release (December 17).

Mark Boslough pioneered the modeling and popularized the understanding of cosmic airbursts. He has contributed to NASA- and DOE-funded impact research and planetary defense programs for four decades at Caltech, Sandia National Laboratories, Los Alamos National Laboratory, and the University of New Mexico. He is a fellow of the Committee for Skeptical Inquiry. Asteroid 73520 Boslough (2003 MB1) was named in his honor. He can be found on twitter @MarkBoslough.

Joe Nickell, PhD, is CSI's senior research fellow. He is a former Pinkerton detective and author of nearly fifty books, including the forensic textbook *Crime Science*.

Hidden in Plain Sight: Discovering the Bigfoot Bear

In memory of Michael Dennett

As what some would call a skeptical cryptozoologist, I prefer to think of myself as a *paranatural naturalist*—one who first considers allegedly paranatural/paranormal entities as hypothetically natural creatures, then seeks to identify them. Here I focus on North America's hairy man-beast.

Sasquatch or Bigfoot, long presumed to be a cross between a monster and a myth, may instead be some other type of hybrid. The earliest recorded footprints of the presumed creature are dated 1811. A trader named David Thompson was crossing the Rockies when he came upon a mysterious track measuring fourteen by eight inches and characterized by four toes with short claw marks. Smithsonian expert John Napier (1973, 74), however, would come to argue that it could well have been a bear, whose small inner toe may not have left a mark. Discoverer Thompson himself thought it likely "the track of a large old grizzled bear" (quoted in Hunter with Dahinden 1993, 17).

Although after 1958 generally called Bigfoot, the creature is historically associated with the Pacific Northwest, and sightings have been reported since then throughout much of the United States and Canada (Bord and Bord 2006). Many have been hoaxes, but others are no doubt misperceptions resulting from expectation and excitement. But misperceptions of what? With that question I hope to invoke a thoughtful, investigative approach (rather than a dismissive "debunking" one).

The Bigfoot Bear

Of creatures in North America, the best lookalike for the bipedal, hairy man-beast called Bigfoot—other than the costumed human pretender "Bigsuit"—is what some years ago I began to call the "Bigfoot Bear." That is any bear, commonly black or brown (grizzly), that may be mistaken for Bigfoot, especially when it is in its alert mode, standing on its hind legs and sniffing the air. (A standing black bear, for example, can be seven feet tall [Yosemite 2013].)

I do have an affinity with bears. As a boy visiting Yellowstone National Park with my family, I was fascinated by upright-standing grizzlies. Traveling in 1971, I would have the rare opportunity to witness a "dancing" bear in Istanbul. And when I lived in the remote north of Canada's Yukon Territory at Dawson (1975–1976), as manager of a riverboat on the Yukon, I once helped catch a large female grizzly. (A mobile cage had malfunctioned, but I insisted she not be shot. She sat close by, eating a piece of bait meat. Savvy Capt. Dick Stevenson rigged the mechanism to work at the pull of a rope while—ironically—I guarded him with a rifle. Then, voilà!)

Since 1995, for the Committee for Skeptical Inquiry and Skeptical Inquirer, I have been on several Bigfoot searches that have taken me into bear country, including the mountains overlooking Bluff Creek, California (site of the 1967 Patterson film); the wilds of British Columbia; the Adirondacks; along Florida's Panhandle; and elsewhere, including Mt. Rainier in Washington State. Far up Rainier, I encountered fresh bear droppings (identified by my professional guide). In Pennsylvania once, a bear lumbered across the logging road my wife, Diana, and I were traveling along.

Again, a rumored "Bigfoot" that she and I were pursuing in February 2008 (renting a cabin in the north Pennsylvania forest) turned out to have been, apparently, a black bear with mange (Nickell 2011, 62).

Lookalikes

Over time I noticed, in fact, that it was fairly common for claimed Bigfoot eyewitnesses to state they first thought they had seen a bear—thus confirming the similarity of Bigfoot and bears—but then sometimes they would "correct" these first impressions. (Such a revision—like a movie director's "retake"—could be called a "miss-take.") Witnesses may cite some aspects of appearance or behavior as the reason for the change of mind, or perhaps the creature was seen only briefly or at a distance, or at

nighttime, or otherwise under less than favorable conditions. Were they perhaps right the first time?

The respective creatures (the real and the questioned) have a roughly similar anatomy. For an article comparing them, I did a cartoon in split-image fashion, comparing half each of a bear and of Bigfoot (Nickell 2013). Anthropologist and "Sasquatch" theorist Jeff Meldrum (2019) took exception and responded with overlays showing differences in detail. However, where I had depicted a generic bear, he chose a black bear, which was less favorable to my position. Of course, the real problem we both had was that Bigfoot lacked any real-world example!

Meldrum stated: "The chance of mistaking a bear sighting for a Sasquatch is conceivable, but unlikely for a knowledgeable experienced observer under favourable conditions." He cited bears' "prominent ears atop their heads, long snouts, sloping shoulders due to their lack of collar bones (clavicles), and short legs" (Meldrum 2019, 60). But if Bigfoot is reported more by amateur than professional observers, as we may suspect, then the gross similarity of bears to "Bigfoot" is profoundly relevant—despite Meldrum's attempt to sweep the issue under the forest litter.

Canadian wildlife biologist John Bindernagel notes the fact that most field guides lack information helpful to eyewitness identification of Bigfoot. He states:

> As a result, most wildlife biologists continue to insist on misidentified bears as the most likely explanation for *sasquatch* reports despite its unbear-like appearance. The continued absence of the *sasquatch* from current field guides constitutes an authoritative statement against the existence of this species in North America. (Bindernagel 1998, 56)

Behavior

Moreover, Bigfoot shares many behavioral aspects with bears. These include eating berries, fruit, grubs, vegetation such as corn, fish, animal carcasses, and human rubbish. It may be seen either day or night, and it often visits campsites—such as one raided by a "cinnamon-colored Bigfoot" in Idaho in the summer of 1968 that left tooth marks on food containers.

Bigfoot also peers into homes (just like a bear, which was once vividly described to me when I was researching Bigfoot in the Adirondacks), as well as vehicles, and it sometimes shows aggression. Then there are Bigfoot's vocalizations, such as growls and snorts, many of which could well be those of bears (Bord and Bord 2006, 215–310; *cf.* Nickell 2013, 12–15).

Distribution

The habitat of Bigfoot given in the 1,002 abstracts I studied—from 1818 to November 1980—is extensive (Bord and Bord 2006, 215–310; Nickell 2011, 225–229). It includes most continental American states and eight of the thirteen Canadian provinces. The greatest number of sightings were in the U.S. Pacific Northwest and British Columbia—the traditional domain of Sasquatch—followed by Pennsylvania and Florida. It was reportedly seen in woods and fields, along streams, and so on. Put another way, Bigfoot is typically found in bear country, except that it cannot actually be found.

Not surprisingly then, black bears are similarly distributed, as shown by population maps provided by the Audubon Society (Herrero 2002, 80). America's grizzly population—once quite extensive and including the western states—is now relegated mostly to portions of the northernmost areas of Washington, Idaho, and Montana, as well as most of British Columbia, the Northwest Territories, the Yukon Territory, and Alaska (Herrero 2002, 4; Whitaker 1996, 708). Again, like Bigfoot, bears are seen in woods and fields, along streams, and so on.

Wishful Thinking

Despite the lack of a single specimen, Meldrum stubbornly clings to the idea of Bigfoot, which he unfailingly calls Sasquatch (a term that was homogenized from several Native American names for the alleged creature by Canadian schoolteacher J.W. Burns in the 1920s [Nickell 2011, 66]).

Meldrum puts hope in the "footprint evidence." However, that is likely polluted with hoaxed prints. And how do we determine which of so many questionable tracks could be genuine, when—like the supposed creature itself—there is not a single "known standard" for comparison? Also, not only does a bear's hind foot look strikingly human, but at moderate speeds the hind- and forefoot prints may superimpose to create what looks like a single bipedal creature's track (Napier 1973, 150–151).

So, we can see what appears obvious, that many encounters—other than hoaxes, including the phony "Bigsuit"—can be explained by the "Bigfoot Bear." Upright bears—especially if seen under poor viewing conditions—are North America's best Bigfoot lookalike. They also frequently behave like Bigfoot, inhabit regions common to the legendary creature, and sometimes even leave Bigfoot-like tracks. I would go so far as to say that upright-walking bears may have innocently given rise to the myth of Sasquatch/Bigfoot! It may be the simplest explanation after all. If people tend to describe the mythical result as somewhat more resembling a hairy human than a bear, that seems only to confirm interest in ourselves, just like artists who portray the unlikely creature as resembling us. ■

References

Bindernagel, J.A. 1998. *North America's Great Ape: The Sasquatch*. Courtenay, BC: Beachcomber Books.

Bord, Janet, and Colin Bord. 2006. *Bigfoot Casebook Updated: Sightings and Encounters from 1818 to 2004*. N.p.: Pine Winds Press.

Herrero, Stephen. 2002. *Bear Attacks*, rev. ed. Guilford, CT: The Lyons Press.

Hunter, Don, with René Dahinden. 1993. *Sasquatch/Bigfoot: The Search for North America's Incredible Creature*. Toronto, ON: McClelland & Stewart.

Meldrum, Jeffrey. 2019. Bears, wildmen, Yeti, and Sasquatch. In Nevin, et al. 2019, 55–66.

Napier, John. 1973. *Bigfoot: The Yeti and Sasquatch in Myth and Reality*. New York: E.P. Dutton.

Nevin, Owen, Ian Convery, and Peter Davis. 2019. *The Bear: Culture, Nature, Heritage*. Woodbridge, UK: The Boydell Press.

Nickell, Joe. 2011. *Tracking the Man-Beasts*. Amherst, NY: Prometheus Books.

———. 2013. Bigfoot lookalikes: Tracking hairy man-beasts. Skeptical Inquirer 37(4) (September/October): 12–15.

Whitaker, John O. 1996. *National Audubon Society, Field Guide to North American Mammals*, rev. Ed. New York, NY: Alfred A. Knopf.

Yosemite Black Bears. 2013. Available online at http://www.yosemitepark.com/bear-facts.aspx; accessed March 25, 2013.

[NOTES ON A STRANGE WORLD

MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

The Elusive Yorkshire Ripper: A Case of Confirmation Bias

Between 1975 and 1980, terror gripped the northwest of England. A serial killer, who with little imagination the newspapers christened "The Yorkshire Ripper," identified women alone on the streets in the evening, some of them prostitutes, and convinced (or forced) them into his car. The predator, armed with a hammer and screwdriver, killed thirteen women and injured at least seven others. Although he seemed untouchable—almost a ghost that reminds the public of the mysterious Victorian serial killer Jack the Ripper—the police had many opportunities to arrest him. Nine times, in fact, investigators questioned Peter Sutcliffe, a truck driver who for one reason or another continued to pop up on the list of possible suspects but ended up being released each time.

On one occasion, the police showed Sutcliffe a photograph of a boot print found next to a victim, but no one noticed that the man was wearing exactly the same type of boots at that moment. On a different occasion, a £5 note was found in the pocket of a victim. From the serial number, it was traced back to the transport company Clark Transport, where Sutcliffe worked. But still no one made the connection. Sutcliffe had been arrested in 1969, because he was found armed with a hammer in a red light district. And a friend of his, Trevor Birdsall, had accused him in an anonymous letter of *being* the serial killer everyone was looking for. Tracy Browne, only fourteen years old, who survived five blows from the killer's hammer, described his appearance so well that the identikit obtained looks like a photograph of Peter Sutcliffe. Descriptions from his other victims were similarly close.

But none of this was of any use. Eventually, Sutcliffe ended up in jail by accident, on January 2, 1981. Traffic police stopped the car in which he had secluded himself with a prostitute. They were both taken to the station, and it

turned out that the car was stolen. It was the same type of car seen several times near the crimes. The man explained that he changed the license plate on the car so as not to let his wife know that he was visiting prostitutes. Incredibly, the police believed him and once again were about to release him, when a car check led to the discovery of a screwdriver. Not far from where Sutcliffe was stopped, a hammer and a knife were also found. Only then, under pressure, did Peter Sutcliffe confess that he was the Yorkshire Ripper.

But why wasn't he arrested earlier? Why was he always excluded whenever he was suspected or questioned? Because he didn't fit with the investigators' idea of the killer. The police, for example, had received a tape in an anonymous package in which the alleged killer bragged about his successes. His voice had a strong northeast accent, which Sutcliffe did not possess. But that tape was a fake, the joke of a mythomaniac. There were many reasons to suspect that fact, yet what the voice said in the tape fit in well with the idea the police had built about the "killer of prostitutes." Besides, Sutcliffe was married, and *he had said* he didn't hang out with prostitutes. This, in fact, was the real problem: investigators were convinced that, just like Jack the Ripper, the killer "only killed prostitutes." "He's a man who hates prostitutes," the detectives had declared on TV. And from this certainty all the rest descended.

They were, however, totally wrong.

Sutcliffe was a misogynist, a man who hated all women. In fact, although he had hit some prostitutes, they were not his only victims. He was simply looking for single women, and in some areas, at night, it might be easier to find a prostitute. But they were not the only ones he killed. When a woman who did not prostitute herself was murdered by Sutcliffe, there were a thousand pretexts to identify her as a "naughty girl." Maybe she had economic problems and therefore, the detectives speculated, she had to prostitute herself to get by, even if there was no evidence that she ever did.

But when women or girls had been attacked by Sutcliffe, and miraculously managed to escape, their stories—the details they gave, the precise descriptions they offered of the assailant—were simply ignored, because these women did not seem the type of victims of the "real" Ripper. The police were looking for Jack the Ripper, an evil menace, not some petty Bradford truck driver.

So we have to ask ourselves: Why did the police fail so miserably? Because the investigators let themselves be blinded by their prejudices. And most importantly, they refused to change their minds whenever the evidence disproved their beliefs. It was a bad case of confirmation bias, yes, but they were not the only ones suffering from it.

"We all have blind spots in our knowledge and opinions," writes psychologist Adam Grant in his excellent book *Think Again*, devoted to questioning one's own beliefs. "The bad news is that they can leave us blind to our blindness, which gives us false confidence in our judgment and prevents us from rethinking. The good news is that with the right kind of confidence, we can learn to see ourselves more clearly and update our views" (Grant 2021).

The British investigators in the Yorkshire Ripper case could have taken the same hint by listening to what almost a century earlier another English detective, however imaginary, had said: "It is a huge mistake to theorize before having the data in hand," declared Sherlock Holmes in the short story *A Scandal in Bohemia*. "Gradually we begin to distort the facts to make them agree with the theories, rather than formulating theories based on facts."

And this is a trap in which everyone, to some degree, can fall into. Why? Because we are not accustomed to thinking like scientists, and so we are always more likely to seek confirmations for something we believe in rather than facts that could disprove it. ■

Reference

Grant, A. 2021. *Think Again*. New York, NY: Penguin Random House, 35.

[THE PHILOSOPHER'S CORNER MASSIMO PIGLIUCCI

Massimo Pigliucci is the K.D. Irani Professor of Philosophy at the City College of New York and an author, blogger, and podcaster. His academic work is in evolutionary biology, philosophy of science, the nature of pseudoscience, and practical philosophy. His books include *Nonsense on Stilts: How to Tell Science from Bunk* and *Philosophy of Pseudoscience: Reconsidering the Demarcation Problem* (coedited with Maarten Boudry). For more, see http://philosophyasawayoflife.blog/.

Science Denialism Is a Form of Pseudoscience

With this new column, we are delighted to welcome back to our pages on a regular basis our esteemed colleague the philosopher and evolutionary biologist Massimo Pigliucci. His first SI column, "Thinking about Science," ran for twelve years from 2002 to 2015. This new column will explore skepticism from the viewpoint of the philosophy of science. —The Editors

The term *pseudoscience* has been the object of a renewed interest by philosophers of science in recent years. This is not just because the so-called *demarcation problem*—the question of what distinguishes science from pseudoscience—is inherently interesting to philosophers and epistemologists. It is also because pseudoscience matters, as in the case of the increasingly clear negative personal and societal effects of, for instance, vaccine and climate change denialism.

But is *denialism* the same thing as pseudoscience? What do people who reject the notion of evolution, say, have in common with people who push homeopathic "remedies"? My colleague Sven Ove Hansson of the Royal Institute of Technology in Stockholm has written an insightful paper about this (Hansson 2017). [Hansson also wrote "The Hidden Connection between Academic Relativists and Science Denial" in the September/October 2021 Skeptical Inquirer.—Eds.] Hansson begins by distinguishing two kinds of bad epistemic practices that fall under the broader umbrella of pseudoscience: science denialism and pseudotheory promotion. The former includes denial of evolution, climate change, vaccine efficacy, etc. The latter has to do with homeopathy, astrology, ancient astronaut theories, and so on.

Hansson suggested in a previous paper that a statement should be considered pseudoscientific if it satisfies three criteria: 1) it refers to an issue that falls within the domain of science, broadly construed; 2) it is so unreliable that it cannot be trusted; and 3) its proponents actively attempt to create the impression that the statement is highly reliable in its own domain.

Let's take one example each of denialism and pseudotheory promotion to see how they fit the three criteria. Evolution denialism concerns the domain of biological history and variation, clearly within the purview of the science of biology. It is unreliable because it hinges on a seriously flawed interpretation of the evidence, as when creationists argue that the Grand Canyon was formed in the span of a single worldwide flood. And yet creationists insist that not only are they doing sound science, but such "science" ought to be taught in public schools.

Consider now astrology as an instance of pseudotheory promotion. It is easy to see how it too satisfies Hansson's three criteria. Astrologers are interested in a domain that properly belongs to science—in this case psychology, not astronomy as it is often claimed, because astrology has to do with the causes of human behavior, not with celestial mechanics or physics. Claims by astrologers have repeatedly been shown to be highly unreliable, for instance in a famous paper published by Shawn Carlson (1985) in *Nature*. [See News and Comment, "Double-Blind Test of Astrology Avoids Bias, Still Refutes the Astrological Hypothesis," in the Spring 1986 Skeptical Inquirer, pp. 194–196, for a summary of that paper.] And astrologers certainly do present themselves as

making reliable statements in their chosen domain.

Notice that the two categories of pseudoscience identified by Hansson are not mutually exclusive and should in fact be considered as endpoints along a continuum. Sometimes the very same set of claims is *both* an example of denialism *and* one of pseudotheory promotion. Creationists both deny the scientific theory of evolution and promote their own pseudotheories as if they were scientifically sound.

Philosophers of science have recognized for some time now that there are two conceptually distinct, yet intertwined, aspects of both science and pseudoscience. Let's call them the epistemic and the sociological aspects. Science is a social activity, not in the naive social constructionist sense but in the obviously undeniable one that it is a human endeavor, characterized by accepted practices (peer review, granting agencies, publications, etc.) and power structures (mentor-student, senior-junior colleagues, administrator-researcher, etc.). But science is also, obviously, an epistemic activity, meaning that it aims at reliably discovering things about the world.

Hansson uses the same dual approach to better characterize pseudoscience. Let's begin with the epistemic aspect, where we find four kinds of recurrent epistemic vices, so to speak, in the practice of pseudoscience. The first one is cherry-picking. For instance, deniers of the general theory of relativity (oh yeah, that's a thing!) have published a list of alleged counterexamples to the theory in Conservapedia, the conservative "equivalent" of Wikipedia. While many of these anomalies are actually perfectly explicable by contemporary physicists, the list entirely ignores the overwhelming positive evidence for the theory, which has steadily and impressively accumulated over the past century.

A second epistemic vice typical of pseudoscience is the neglect of contrary or refuting information. The above-mentioned general relativity denialists, for instance, keep holding on to pre-relativistic physics despite the fact that it has been abandoned by the physics community at large. For example, they bring up a proposal by Swiss physicist Georges-Louis Le Sage, who in the nineteenth century suggested that gravitation results from the collective pressure exercised on bodies by a large number of small invisible particles. As Hansson notes, this may have been plausible when Le Sage was alive, but it's no longer so. The only reason deniers of general relativity keep bringing it up is because of the preconceived conclusion that they desperately wish to defend.

The third epistemic vice lies in the common fabrication of fake controversies by promoters of pseudoscience. Vaccine denialists often point to the occasional dissenting voice within the medical research community to project the image of a controversy that is not really there but which serves their purposes in terms of sowing doubt among the general public.

The last epistemic vice concerns the use of what Hansson calls "deviant" criteria of evaluation by proponents of pseudoscientific notions. Think of it as raising the bar in such a way as to make it impossible for the other side to meet your criteria of assent to a given theory. For instance, creationists often demand experimental evidence not just of speciation (i.e., the formation of new species) but of the origin of entire classes of living organisms. Speciation is achievable in the laboratory, though rarely. But the evolution of, say, mammals from a fish ancestor can be only indirectly inferred on the basis of the fossil record. To ask for direct proof of it is either disingenuous or extremely ignorant.

Let me now briefly touch on the sociological aspect of pseudoscience, which is just as revelatory as the epistemic one. Here Hansson's detailed study comes up with a whopping ten relevant sociological marks of pseudoscience, but I'll focus on a subset for purposes of illustration. Lack of expertise is one such mark. While the scientific community is made up of often highly specialized experts, expertise is exceedingly rare in pseudoscientific communities. Consider, for instance, those petitions listing a large number of "scientists" who oppose the notion of climate change or vaccines. Not surprisingly, such lists turn out to be made up of people who are considered to be scientists on the basis of having a bachelor of science degree or perhaps who are professional medical practitioners, say dentists, even though the issue under consideration pertains to atmospheric physics or immunology—areas in which dentists are, obviously, not experts.

Proponents of pseudoscience are also uncommonly prone to buy into conspiracy theories. As Hansson writes, climate change denialists think that the problem is a worldwide liberal conspiracy; creationists see immoral atheists at every corner and in every laboratory; and the general-relativity denialism of the 1920s and 1930s was naturally dominated by antisemitism.

Moreover, pseudoscientists have a tendency to appeal directly to the public, bypassing peer review and other forms of expert gatekeeping. They do so under the guise of defending democracy and freedom. Yet when they need, say, financial advice or to have their car fixed, they—reasonably enough—go to a proper expert, democracy and freedom be damned.

An additional recurrent sociological characteristic of pseudoscientific groups is that they are prone to launch vitriolic personal attacks on scientists. For instance, Albert Einstein was subjected to such levels of antisemitism that he considered it unsafe to visit Germany after he left the country. Contemporary scientists who have spoken publicly about climate change or vaccines have also found themselves in a similar predicament.

So upon careful consideration, the term *pseudoscience* refers to a continuum of activities that span from denialism to pseudotheory promotion. Pseudoscientific claims suffer from identifiable epistemic problems (cherry picking, neglect of refuting information, and so on), while pseudoscientific communities display several recognizable sociological markers (lack of expertise, proneness to conspiracy theories, etc.). Of course, individual scientists also can be found to engage in cherry picking or refusing to consider evidence that is damaging to their preferred theory. But what sets science apart is that *as a community* such vices are, by and large, kept in check. That is why neither science nor pseudoscience can be understood in terms of individual claims or individual agents. They can be understood only once we expand our analysis to the communal level. ■

References

Carlson, S. 1985. A double-blind test of astrology. *Nature* 318: 419–425.

Hansson, Sven Ove. 2017. Science denial as a form of pseudoscience. *Studies in History and Philosophy of Science* 63: 39–47.

[REALITY IS THE BEST MEDICINE

HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the Science-Based Medicine blog. Her website is www.skepdoc. info.

The Science (and Pseudoscience) of Aging

Some animals (such as hydras and some jellyfish) can apparently live forever, but we humans are all going to die. Longevity is desirable, but aging—a slow process of deterioration—is not. Hearing declines (half of those older than seventy-five have disabling hearing loss), as does visual acuity (by age eighty, 70 percent of white Americans have cataracts [National Eye Institute 2019]). Reflexes are slower; reaction time increases. Strength declines, and bone density decreases. The skin thins and bruises more easily. Wrinkles develop; the hair turns gray and then white. Height decreases by one to three inches. Dementia increases with age, affecting 19 percent of those between ages seventy-five and eighty-four and nearly half of those over eighty-five. Numerous diseases become more common, such as diabetes, cancer, and cardiovascular disease. If they live long enough, almost all men will develop prostate cancer although most of them will die *with* it rather than *because* of it.

As my brother says, "Old age is highly overrated." Most of us want to live as long as possible but would like to avoid the deterioration of aging. So it's only natural that antiaging remedies abound. Sadly, most of them are just false hope, hype, and snake oil. The consequences of aging are not all bad: the elderly have extensive life experience, more general knowledge, and more wisdom. And they report greater happiness.

Maximum Human Life Span

The so-called Blue Zones are geographical locations where people are said to live longer than elsewhere. These include Sardinia, Okinawa, Loma Linda (California), the Nicoya Peninsula in Costa Rica, and Icaria (Greece). The first Blue Zone was reported by Poulain et al. (2004), and

the concept has been popularized by Dan Buettner, who writes books promoting a Blue Zone diet (Buettner n.d.). Reports of longevity are often questionable, however, because of poor record-keeping and confusion with parents or grandparents who had the same name. The record for the longest definitely verified life span belongs to Jeanne Calment of France, who died in 1997 at age 122. She was deaf and blind (having refused cataract surgery) but remained mentally sharp.

Calment benefitted from a real estate transaction that seemed like a good deal at the time but proved to be a bad bargain for the buyer. As related on Wikipedia:

> In 1965, aged 90 and with no heirs left, Calment signed a life estate contract on her apartment with notary public André-François Raffray, selling the property in exchange for a right of occupancy and a monthly revenue of 2,500 francs (€380) until her death. Raffray died in 1995, by which time Calment had received more than double the apartment's value from him, and his family had to continue making payments. ("Jeanne Calment" 2021)

To what do long-lived people attribute their longevity? Each of them offers an explanation, but they seldom agree. Some of their theories seem plausible, but some are imaginative nonsense and might even be harmful, for instance, eating raw eggs every day. What was Calment's secret? She attributed her longevity to a diet rich in olive oil, but it was more likely due to good genes and good luck. She came from a long-lived family. She smoked and drank alcohol but very sparingly. In her later years, she was 4' 6" tall and weighed eighty-eight pounds.

Causes of Aging

Researchers have failed to find a uniform marker for aging. The aging process seems to be different for different individuals; it is varied, chaotic, and idiosyncratic. There is probably no single cause, but many causes have been proposed: collagen breakdown, UV light, oxidation, inflammation, insulin resistance, glycation, free radicals,

To what do long-lived people attribute their longevity? Each of them offers an explanation, but they seldom agree.

accumulation of DNA copying errors, telomere shortening, accumulation of waste products, heterochromatin loss, and many others. I suspect that many of these factors are contributory and that they interact with each other.

Ray Kurzweil believes that science will soon discover the key to immortality, and if he can just stay alive until then, he believes he will be able to live forever. He optimistically takes 250 supplement pills a day, gets weekly IV infusions, uses acupuncture and Chinese herbs, and does other things that he thinks might help keep him alive. His approach is nothing but hope and speculation.

Telomeres

Telomeres are repeated sequences of nucleotides at the end of a chromosome. One of the ideas for prolonging life that has seemed most promising is based on the observation that telomeres shorten with age. The hope is that if we could prevent that shortening, it might prolong life. For vertebrates, the sequence is TTAGGG. The repeats number in the hundreds or even thousands. They protect the end of the DNA strand, analogous to the way an aglet (the hard piece at the end of a shoelace) prevents a shoelace from unraveling. When cells divide, DNA is copied, but copying does not accurately extend to the end of the telomere. Therefore, with every copy the telomere becomes shorter. The number of times a cell can divide is limited. That's called the Hayflick limit and is around forty to sixty replications for human cells in cultures in the lab. Supposedly when the telomeres get too short, the cell can no longer divide, and death results. Telomere shortening has been shown to correlate with aging and with age-related diseases. The theory is that if only we could prevent telomere shortening, we could conquer aging. The enzyme telomerase effectively lengthens telomeres, and many antiaging products promise to increase telomerase levels.

That may seem persuasive, but the reality is more complicated. Accurate measuring of telomere length is problematic. Telomere shortening might *accompany* aging but not be the *cause* of aging. And it's not universal. In some animals, telomeres *lengthen* with age. Increasing telomerase may not be such a good idea because it may facilitate the development of cancers. Treatments aimed at lengthening telomeres have not been proven to prevent aging. There is one species of bats whose telomeres don't shorten with age (Martella 2018). They live far longer than other bat species and are more resistant to disease. They do not express telomerase. Scientists are studying them, hoping their research may suggest a way to address human aging.

Antiaging Approaches

Severe calorie restriction has been shown to prolong life and improve health in many animals. However, studies of primates have had mixed results, and no data is available for humans. We're talking about *severe* calorie restriction—a diet that few people would be able or willing to follow long term. Intermittent fasting may improve the symptoms of asthma and reduce the risk of Alzheimer's and Parkinson's. Fasting before chemotherapy seems to result in fewer side effects and a better response.

Rapamycin has been shown to increase lifespan in animals and reduce many of the signs of aging. But it carries serious risks. Also known as sirolimus, rapamycin is a compound originally discovered in the bacterium Streptomyces hygroscopicus from Easter Island. It is an immunosuppressant drug that inhibits activation of T cells and B cells. It has many medical uses, notably to prevent rejection of kidney transplants. Up to 20 percent of patients develop adverse effects, ranging from edema and high blood pressure to infections, lym-

n.d.).

Resveratrol (found in red wine) increased the survival of obese mice fed a high calorie diet. Some hoped that resveratrol would allow people to overeat with impunity, but clinical trials in humans were disappointing. The daily dose that was effective in mice would have corresponded to thirty-five bottles of wine for a human. Metformin, aspirin, coffee, alcohol in moderation, curcumin, ibuprofen, and other substances have shown positive results in some studies, but the effects were not strong enough to warrant recommending them for everyone.

Examples of Bogus Remedies

Products claiming antiaging benefits abound. Here are a few of them.

Serovital contains five amino acids (lysine, arginine oxo-proline, N-acetyl cysteine, and L-glutamine) and a powdered herb, Japanese catnip. It claims to raise HGH levels by a whopping 682 percent, but that is based on a single study of only sixteen subjects. Even if it did actually raise HGH levels, there is no evidence of clinical benefit and no evidence that HGH slows aging. Proponents claim that "boosting HGH blood levels can reduce body fat; build muscle; improve sex life, sleep quality, vision and memory; restore hair growth and color; strengthen the immune system; normalize blood sugar; increase energy; and 'turn back your body's biological clock.'" That's not true, and increased HGH levels can be dangerous. Harmful side effects include an increased risk of cancer and cardiovascular disease. High levels of HGH may even *accelerate* the aging process. According to *Quackwatch*, "So-called growth hormone releasers" should be regarded as fakes (Barrett 2016).

The company that sells Product B claims that "Almost every known disease can be attributed to the shortening of telomeres," and Product B supposedly reverses telomere shortening. It's a mixture of four vitamins and a proprietary blend of some thirty herbal products, such as thistle, horny goat weed, ginseng, and green tea. Most of these have never been shown to activate telomerase. In fact, several of the ingredients are known to *inhibit* telomerase.

PatchMD sells a product that makes antiaging claims for vitamins A, C, D, B3, B6, B9, curcumin, clove extract, ginger root extract, Indian gooseberry extract, L-carnitine, CoQ10, resveratrol, choline, glutathione, NAC, and alpha-lipoic acid. It combines all these in a convenient Anti-Aging Topical Skin Patch, supplying the nutrients via the skin. They claim all these ingredients are backed by science for their antiaging effects, but that's a real stretch. It's based mainly on their antioxidant and anti-inflammatory properties. At least they provided a proposed (pseudo-)scientific rationale.

Vital Stem is advertised as a miracle antiaging remedy. It is a mixture of vitamin D, leucine, blueberries, green tea leaf extract, and L-carnosine. It supposedly increases the body's production of stem cells. Does it? How could we know? Like those other questionable remedies, it has never been properly tested.

To prove that a product increases longevity, it would be necessary to follow a large group of people with and without the product over many years to see if there was really a clinically significant difference. This would be impractical if not impossible. It has not been done and is not likely to be done. To prove that a product has antiaging effects, we would have to have a way to reliably measure those effects. We would need to have a better understanding of what causes aging and show with a good, controlled study that the product produces better clinical outcomes than a placebo.

The Bottom Line

Science is working on it but hasn't yet found a reliable way to increase longevity or avoid aging. But science *has* shown us how to reduce the risk of preventable diseases and premature death. We can exercise, stop smoking, avoid obesity, control blood pressure and cholesterol levels, get vaccinated, and eat a healthy diet based largely on plants. A 2011 study showed that if seven risk factors are addressed (diabetes, midlife obesity, midlife hypertension, smoking, depression, low educational level, and physical inactivity), fully half of all Alzheimer's cases could be prevented (Barnes and Yaffe 2011).

To prove that a product increases longevity, it would be necessary to follow a large group of people with and without the product over many years.

Prominent gerontologist and researcher Jay Olshansky says there is no such thing as antiaging medicine. He says the secret to aging is that there is no secret. Dr. Joe Schwarcz of McGill's Office for Science and Society said it best: "The science [of antiaging] is all wet and drips with crackpot notions."■

References

Barnes, Deborah E., and Kristine Yaffe. 2011. The projected effect of risk factor reduction on Alzheimer's disease prevalence. *The Lancet Neurology* 10(9): 819–828. Available online at https://www.thelancet.com/journals/laneur/article/PIIS1474-4422(11)70072-2/fulltext.

Barrett, Stephen. 2016. Growth hormone schemes and scams. *Quackwatch* (June 5). Available online at https://quackwatch.org/related/hgh/.

Beuttner, Dan. N.d. Groundbreaking books. Blue Zone. Available online at https://www.bluezones.com/#section-5.

"Jeanne Calment." 2021. Wikipedia (October 11). Available online at https://en.wikipedia.org/wiki/Jeanne_Calment.

Martella, Dominic. 2018. Scientists unlock the molecular secret behind long-lived bat species. University College Dublin (February 8). Available online at https://www.ucd.ie/newsandopinion/news/2018/february/08/scientistsunlockthemolecularsecretbehind-long-livedbatspecies/.

National Eye Institute. 2019. Cataract Data and Statistics (July 17). Available online at https://www.nei.nih.gov/learn-about-eye-health/outreach-campaigns-and-resources/eye-health-data-and-statistics/cataract-data-and-statistics.

Pfizer. N.d. Rapamune adverse reactions. Available online at https://www.pfizermedicalinformation.com/en-us/rapamune/adverse-reactions.

Poulain, Michel, Giovanni Pes, Claude Grasland, et al. 2004. Identification of a geographic area characterized by extreme longevity in the Sardinia island: The AKEA study. Experimental Gerontology 39(9): 1423–1429. Available online at https://halshs.archives-ouvertes.fr/halshs-00175541/file/2004%20POULAIN%20BZ%20EXP%20GERONT.pdf.

[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

Why Your Uncle Isn't Going to Get Vaccinated

Image Credit: Marco Verch

Almost all of us know someone—maybe a relative, friend, or coworker—who is unvaccinated. In my case, it's a local craftsperson whose services I use on a regular basis. "I'm just not comfortable with it. I might get it if I had to travel abroad or something, but I don't go anywhere." However, I am quite certain this person goes to the grocery store and other places where they could get infected. Although I'm fully vaccinated, I wear a mask when I'm in this person's shop.

As I write this in mid-October 2021, only 56 percent of the U.S. population has been vaccinated, and several industrialized countries have overtaken us on this measure. Figure 1 shows a very slight uptick in U.S. vaccinations in the late summer of 2021, but that timing also coincides with the CDC's approval—just in time for the start of the school year—of the Pfizer-BioNTech vaccine for children aged twelve through seventeen (Centers for Disease Control and Prevention 2021). Also, as I write this—by a margin of more than 140,000 over Brazil—the United States still leads the world in COVID-19 deaths (744,000, or approximately one out of every 445 people) and SARS-CoV-2 infections (45.8 million, or 13.8 percent of the population).

The vaccines for COVID-19 have been widely available in the United States since at least March—many months ago. I am here to tell you that at this point, the people who are unvaccinated are unlikely to get vaccinated. For those of us who value science, evidence, and our health, this seems crazy. I have had countless conversations with friends that begin and end with the statement, "Why don't these people just get vaccinated?" For a long time, we heard people

saying that they would not get vaccinated until the Food and Drug Administration (FDA) gave full approval to the vaccines. At least in the case of the Pfizer-BioNTech vaccine, full FDA approval came on August 23, 2021, and some news organizations claim to have detected an uptick in vaccinations after that date (e.g., Mitropoulos 2021). But as previously mentioned, that timing coincides with the start of the school year and childhood vaccination. At this point, it is clear that many of the people who started out hesitant are no longer hesitating. They are set in their decision not to get the shot. Why?

The psychology of vaccine hesitancy was a topic of research before the SARS-CoV-2 virus appeared, and I am sure health policy researchers are busy working on this topic as we speak. But there are some features of this wave of vaccine rejection that are quite different from earlier vaccine hesitancy movements. Using the hypothetical example of your anonymous uncle, I will offer a few reasonable hypotheses about why he's not vaccinated at this late date. Finally, I will try to end this column on an upbeat note.

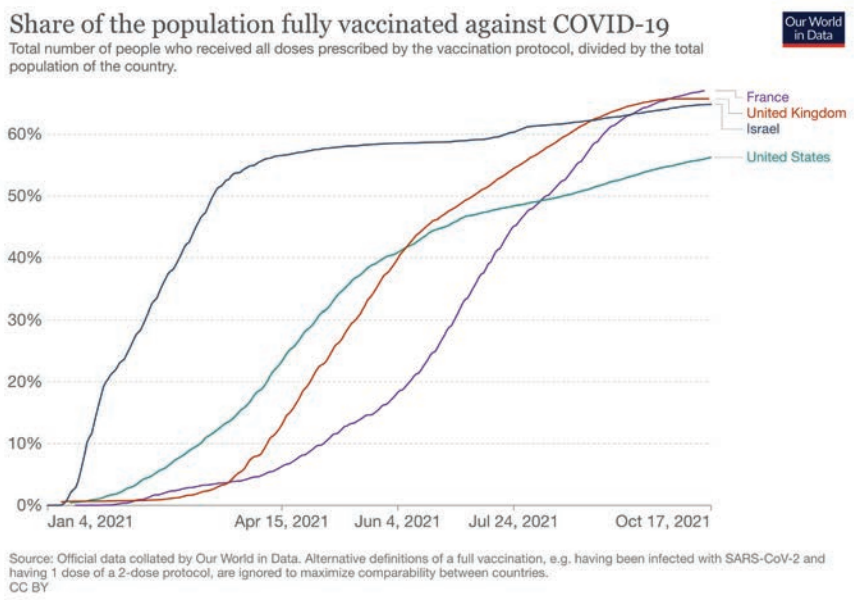

Share of the population fully vaccinated against COVID-19
Total number of people who received all doses prescribed by the vaccination protocol, divided by the total population of the country.
Our World in Data
France
United Kingdom
Israel
United States
60%
50%
40%
30%
20%
10%
0%
Jan 4, 2021
Apr 15, 2021
Jun 4, 2021
Jul 24, 2021
Oct 17, 2021
Source: Official data collated by Our World in Data. Alternative definitions of a full vaccination, e.g. having been infected with SARS-CoV-2 and having 1 dose of a 2-dose protocol, are ignored to maximize comparability between countries.
CC BY

Figure 1. Percentage of the population that is fully vaccinated over time for four countries (ourworldindata.org)

1. Your Uncle Is a Donald Trump Supporter

To the extent that earlier versions of the anti-vaccination movement were politically motivated, they were more likely to come from the left. In recent years, Robert F. Kennedy Jr., a Democrat who has built a reputation as an environmentalist, emerged as a major anti-vaccination spokesperson, promoting the discredited idea that childhood vaccines cause autism. In a rare example of bipartisanship, he has since embraced the largely conservative anti-COVID-19 vaccine movement and, as a result, has been banned from Instagram for spreading false information (Chappell 2021). The previous anti-vaccination movement was not strictly liberal. Recall that candidate Donald Trump alluded to the debunked claims of a vaccination-autism connection in the 2016 campaign (Lerer 2021), but in the case of COVID-19 vaccine rejection, it is now an overwhelmingly Republican phenomenon. (For more complete history of vaccine hesitancy and another perspective on the psychology of it, see Barglow 2021.)

Being a Trump supporter is not really a reason to reject vaccination, but it appears to be one of the strongest predictors of your vaccination status. An NBC poll conducted in late August 2021 looked at the relationship of vaccine status to several demographic variables, including education, age, race, and political party (Todd et al. 2021). The poll found the overall rate of vaccination among U.S. adults was 69 percent, and 13 percent of respondents said they would not get vaccinated under any circumstances. There was substantial variation in vaccination rates. For example, 80 percent of white college graduates were vaccinated, whereas only 60 percent of white non-college graduates were vaccinated.

One of the lowest levels of vaccination in the NBC poll was among respondents who voted for Trump in

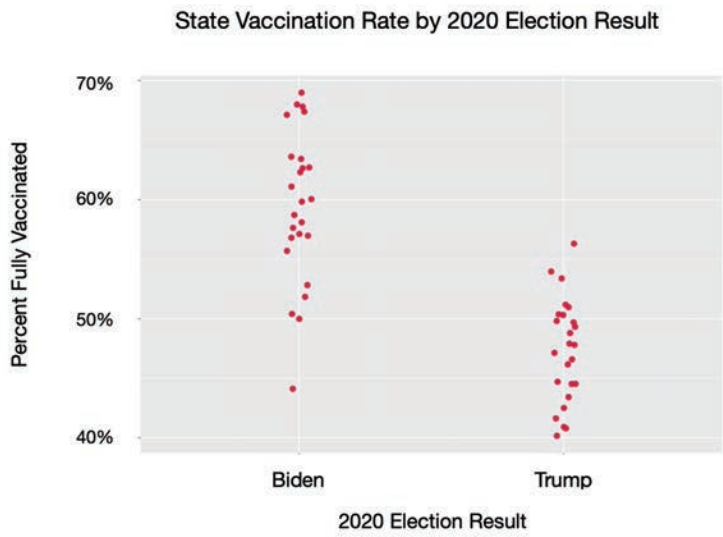


Figure 2. Percentage of population vaccinated against COVID-19 in each of the fifty states as a function of the state's result in the 2020 presidential election. The outlier at 44 percent in the Biden column is Georgia, a state that Biden won by fewer than 2,000 votes. (Vaccination rate data are from ourworldindata.org, updated on September 20, 2021.)

2020: 50 percent, as compared to 87 percent among Joe Biden voters. The overall rate of vaccination among Republicans was 55 percent, but even within the Republican voter group, Trump had a substantial effect. Of the variables measured in the NBC poll, the lowest level of vaccination was among "Republicans who support Trump more than [the] party," with a mere 46 percent vaccinated. Sixty-two percent of "Republicans who support the party more than Trump" reported being vaccinated.

To look at the Trump phenomenon in a different way, I created Figure 2, a plot of the percentage of the population of each of the fifty states that was fully vaccinated on September 20, 2021, as a function of whether the state voted for Biden or Trump in 2020. The results are fairly dramatic, with very little overlap. Although the data hardly need a statistical analysis to make the point, I performed a t-test and found that the results were highly statistically significant: $t(48) = 7.84$, $p < .001$, $d = 2.22$. The mean vaccination rate in Biden states was 59 percent, and 47 percent in Trump states.

Ironically, former President Trump and First Lady Melania Trump were among the first Americans to be vaccinated, but Trump and his supporters have also disparaged all the medical experts who have urged vaccination. As red states became the hotbeds of COVID-19 infections and deaths in the summer of 2021, Trump tried to urge his supporters at a rally to get vaccinated, but he was roundly booed by his own people (Blake 2021). For reasons I will say more about in the next section, it was far too late for Trump to pivot on this issue and hope to sway his supporters.

2. Your Uncle Wants to Avoid Cognitive Dissonance

If you put yourself in the shoes of one of these vaccine rejectors, you can understand why—even in the face of the more virulent Delta variant—they are not going to change their minds now. At the beginning, there was a moment when things might have gone the other way. It might have been different if the nation's political leaders had come out united in favor of vaccines—perhaps President Trump, President-Elect Joe Biden, and their wives could have been vaccinated together in a live televised event. Perhaps Mike Pence and Kamala Harris could have done public service announcements together. But nothing like that happened. Instead, President Trump was almost never seen wearing a mask, and Republican politicians and conservative media figures cast doubt on the severity of the pandemic and the safety of vaccines (Lerer 2021).

By now, that moment of opportunity is long past. We can only imagine that, in the months since vaccines became widely available, the adults such as your uncle who have not yet been vaccinated have had hundreds of conversations with their friends and families and have heard themselves justify their decisions over and over. Once vaccine rejection became a fixed idea, going against that decision would produce cognitive dissonance—an unpleasant motivational state created when our actions conflict with our stated beliefs or values. When the stakes are low, the conflict is sometimes resolved by changing one's beliefs or attitudes, but when the beliefs are more central, the solution is often to remain loyal to your beliefs and avoid those actions that would create dissonance. To suddenly get vaccinated now, without other provocation, would be difficult for vaccine rejectors to justify.

In an earlier column, I considered how QAnon believers would handle the resulting cognitive dissonance when their widely held belief that Donald Trump would be reelected did not come true (Vyse 2021). This was an example similar to the famous book *When Prophecy Fails*, which described the experiences of a religious group that predicted the end of the world on a specific date (Festinger et al. 1956). In that case, when the date of destruction came and went, many people rationalized the prophecy's failure and became even more faithful members of the religious group. But in the case of vaccine rejection, the action that would cause dissonance—getting vaccinated—is under the individual's control. Your uncle can avoid the conflict that would result from changing course so late in the pandemic by remaining true to his risky decision.

3. Your Uncle Thinks COVID-19 Isn't That Serious

A common theme among opponents of mask mandates and lockdowns is

Scène de la peste de 1720 à la Tourette (Marseille) by Michel Serre (1658–1733) (Wikimedia)

that doctors are trying to scare you and COVID-19 isn't that bad. In fact, President Trump, while still in Walter Reed Medical Center receiving state-of-the-art COVID-19 treatments available to almost no one else, tweeted "Don't be afraid of COVID. Don't let it dominate your life" (Kolata and Rabin 2020).

Concern about the pandemic might be greater if the disease were more visible. The great global pandemics of the past were both more deadly and easier to see. The SARS-CoV-2 pandemic is not like previous plagues. Giovanni Boccaccio witnessed the Black Death of Florence in 1348 and described the progress of the disease in *The Decameron*:

> The first sign in both men and women was a swelling in the groin or beneath the armpit, growing sometimes in the shape of a simple apple, sometimes in that of an egg, more or less: a bubo was the name commonly given to such a swelling. Before long this deadly bubo would begin to spread indifferently from these points to crop up all over; the symptoms would develop then into dark or livid patches that many people found appearing on their arms or thighs or elsewhere. (Boccaccio [1351] 2008, 7)

According to Boccaccio, plague victims typically died within three days of beginning to show symptoms. Because the death rate was so great in these earlier periods, bodies piled up in the streets and were carted off by wagons to mass graves. The accompanying painting (on p. 26), showing corpses strewn about a large area, is by Michel Serre (1658–1733), who lived through the plague of 1720.

Even in the Spanish Flu pandemic of 1918, the medical science and healthcare facilities in the United States were far behind what they are today. Temporary mass treatment facilities for both returning World War I soldiers and civilians were much more common. In addition, unlike COVID-19, which has its worst effects on older patients, the Spanish Flu was most deadly for the very old and the very young. Dying children tend to evoke more sympathy and concern than death among the elderly.

Volunteer nurses from the American Red Cross tending influenza sufferers in the Oakland Auditorium, Oakland, California, during the influenza pandemic of 1918. (Photo by Edward A. "Doc" Rogers. From the Joseph R. Knowland collection at the Oakland History Room, Oakland Public Library. Wikimedia.)

Although recent headlines touted that U.S. COVID-19 deaths have now surpassed the U.S. deaths from the Spanish Flu, for a variety of reasons—the most obvious being that the U.S. population was one third the size it is now—the 1918 H1N1 flu virus was still more deadly (Kaul 2021).

In contrast, whenever anyone begins to show symptoms or tests positive for the coronavirus, they immediately quarantine themselves and disappear. It occurs to me that the probability of seeing anyone cough in public is now at its lowest point in my lifetime. We all have learned a lot about how to avoid infection, and one result of that knowledge is that we rarely see sick people. Some people who die of COVID-19 do so at home or in nursing facilities, but many people who are seriously ill go to the hospital. At this point, we know that over 90 percent of the people hospitalized with COVID-19 are unvaccinated (Rosenberg et al. 2021). These people don't trust the medical establishment enough to get vaccinated, but they head to the hospital when they get really sick. Once in the hospital, they are protected by medical privacy laws, and only the healthcare workers see the scope of the problem. In our everyday lives, we see little evidence of sickness, despite living through the largest pandemic in a century. Finally, if I am right that your uncle is a Trump supporter, the media he consumes are not likely to remind him of the ongoing pandemic very often.

If the medical implications of the pandemic were more visible, it would appear more serious, but our modern healthcare practices give your uncle plausible deniability. From his point of view, the most obvious signs of the ongoing pandemic are those annoying masks, lockdowns, and vaccination mandates.

4. Your Uncle Values His Freedom More Than His Health and That of Those around Him

Freedom is one of the most consistent themes stressed by the anti-COVID-19 vaccine movement (Dickey 2021). Even prior to the coronavirus pandemic, research showed the importance of individual rights to vaccine hesitancy. A 2017 study of the moral values favored by vaccine-hesitant parents found they were significantly more concerned about purity and liberty than they were about harm and fairness (Amin et al. 2017). Highly vaccine hesitant parents also showed

significantly lower valuing of authority than non-hesitant parents.

If anything, the theme of liberty and freedom of choice has only strengthened in the current debate over the response to the SARS-CoV-2 pandemic. Florida Governor Ron DeSantis, a Republican who is often mentioned as a potential presidential candidate, is one of the most vocal critics of Dr. Anthony Fauci, the nation's primary authority on COVID-19 policy, and DeSantis often stresses the theme of freedom. However, as the Delta variant of SARS-CoV-2 spread throughout the country in the late summer of 2021, Florida emerged as the leader of a group of largely Republican and relatively unvaccinated states with the highest number of new COVID-19 cases and deaths (Bump 2021).

None of this seems to have deterred the freedom advocates. Even in my solidly blue state of Connecticut where relatively high numbers of people are vaccinated and the infection rate has been low, there is a state-wide advocacy group fighting mask mandates in schools and vaccine mandates in work settings. In a real-world example of what the research shows, the policies advocated by the freedom groups have harmed themselves and others. At this point, the overwhelming majority of people hospitalized with COVID-19 and dying of COVID-19 are unvaccinated (Sullivan 2021).

This is not the first time in American political history that individual rights have come into conflict with public health. Pro-gun advocates frequently cite their Second Amendment individual right to own firearms, but for several decades there has been good evidence that bringing a firearm into your house increases the likelihood of homicide in your home (Vyse 2015). Thanks in part to a very effective gun lobby, many people believe exactly the opposite—that owning a gun makes them safer. The theme of freedom and rejection of government control is strong in both the gun rights and anti-COVID-19 mandate movements, and some politicians have drawn the two issues together. In July 2021, in response to President Biden's proposal to go door-to-door to offer the COVID-19 vaccine, U.S. Representative Madison Cawthorne (a Republican from North Carolina) said, "They could then go door to door and take your guns. They could go door to door and take your Bibles" (Castronuovo 2021). As the research suggests, many people with a strong commitment to their individual freedoms either deny that their actions cause harm or are willing to accept those harms for themselves and others.

Screenshot from a Governor DeSantis promotional video (Facebook)

A Mildly Optimistic Ending

At this point, there is one glimmer of hope: mandates. This will not be an easy route for the politicians, employers, and school systems who impose them. There are already protests, legal challenges, and other forms of resistance, but the evidence suggests that mandates work (Koerth 2021). Vaccine mandates have been employed in the United States as far back as the smallpox epidemic of the late nineteenth century (Astor 2021), and for decades they have been routinely applied to school children. In early September, President Biden announced that all companies with over 100 employees would have to require their staff to be vaccinated or provide a negative COVID-19 test at least once a week (Kavi 2021).

If your uncle (aunt, brother, sister, etc.) is forced to choose among losing his job, submitting to testing, or getting vaccinated, he may give in to getting vaccinated. Similarly, parents who want their kids to go to school may have to get them vaccinated—just like in the old days. As I write this, Pfizer/BioNTech has announced that it will soon ask for approval for the use of their COVID-19 vaccine in children aged five to eleven years.

From a psychological point of view, mandates also provide a hedge against cognitive dissonance. The person who responds to a mandate can claim they still maintain the same beliefs and values about vaccines but have submitted in response to an outside force. "I had to do

it for work." The mandate provides an external force that causes less cognitive dissonance than a more independent choice would produce. It is unclear how many more people will get vaccinated as a result of mandates, but mandates appear to be our last best hope. ■

References

Amin, Avnika B., Robert A. Bednarczyk, Cara E. Ray, et al. 2017. Association of moral values with vaccine hesitancy. *Nature Human Behaviour* 1(12): 873–80. Available online at https://doi.org/10.1038/s41562-017-0256-5.

Astor, Maggie. 2021. Vaccination mandates are an American tradition. So is the backlash. *The New York Times* (September 9). Available online at https://www.nytimes.com/2021/09/09/us/politics/vaccine-mandates-history.html.

Barglow, Peter. 2021. The psychology of U.S. vaccination hesitancy. Skeptical Inquirer 45(6): 52–56.

Blake, Aaron. 2021. Trump and top ally get booed by the monster Trump's GOP created. *The Washington Post* (August 23). Available online at https://www.washingtonpost.com/politics/2021/08/23/trump-booed-gop-vaccines/.

Boccaccio, Giovanni. (1351) 2008. *The Decameron*. Translated by Guido Waldman. Oxford: Oxford University Press.

Bump, Philip. 2021. The inescapable overlap of pandemic and politics. *The Washington Post* (September 10). Available online at https://www.washingtonpost.com/politics/2021/09/10/inescapable-overlap-pandemic-politics/.

Castronuovo, Celine. 2021. Cawthorn: Biden door-to-door vaccine strategy could be used to "take" guns, Bibles. *The Hill* (July 10). Available online at https://thehill.com/homenews/house/562372-cawthorn-biden-door-to-door-vaccine-strategy-could-be-used-to-take-guns-bibles.

Centers for Disease Control and Prevention. 2021. COVID-19 vaccines for children and teens (August 17). Available online at https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/adolescents.html.

Chappell, Bill. 2021. Instagram bars Robert F. Kennedy Jr. for spreading vaccine misinformation. NPR (February 11). Available online at https://www.npr.org/sections/coronavirus-live-updates/2021/02/11/966902737/instagram-bars-robert-f-kennedy-jr-for-spreading-vaccine-misinformation.

Dickey, Colin. 2021. We're talking about vaccines all wrong. *The Atlantic* (July 30). Available online at https://www.theatlantic.com/ideas/archive/2021/07/freedom-is-the-only-argument-that-might-work-with-vaccine-holdouts/619609/.

Festinger, Leon, Henry W. Riecken, and Stanley Schachter. 1956. *When Prophecy Fails*. New York, NY: Harper & Row.

Kaul, Greta. 2021. Why you should be wary of comparisons of the death tolls from the 1918 flu pandemic and COVID-19. *MinnPost* (September 22). Available online at https://www.minnpost.com/health/2021/09/why-you-should-be-wary-of-comparisons-of-the-death-tolls-from-the-1918-flu-pandemic-and-covid-19/.

Kavi, Aishvarya. 2021. Biden's vaccine push: What you need to know. *The New York Times* (September 10). Available online at https://www.nytimes.com/2021/09/09/us/politics/biden-vaccine-plan-highlights.html.

Koerth, Maggie. 2021. Vaccines mandates work, but they're messy. FiveThirtyEight (September 8). Available online at https://fivethirtyeight.com/features/vaccines-mandates-work-but-theyre-messy-business/.

Kolata, Gina, and Roni Caryn Rabin. 2020. "Don't be afraid of Covid," Trump says, undermining public health messages. *The New York Times* (October 5). Available online at https://www.nytimes.com/2020/10/05/health/trump-covid-public-health.html.

Lerer, Lisa. 2021. How Republican vaccine opposition got to this point. *The New York Times* (July 17). Available online at https://www.nytimes.com/2021/07/17/us/politics/coronavirus-vaccines-republicans.html.

Mitropoulos, Arielle. 2021. More Americans getting vaccinated following full FDA approval of Pfizer COVID vaccine. ABC News (August 21). Available online at https://abcnews.go.com/Health/americans-vaccinated-full-fda-approval-pfizer-covid-vaccine/story?id=79750505.

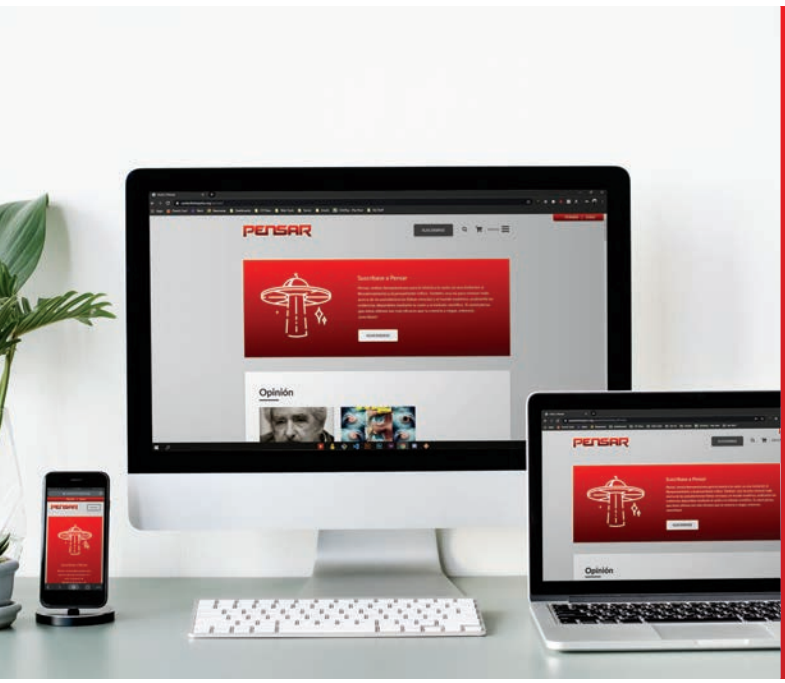
Rosenberg, Eli S., David R. Holtgrave, Vajeera Dorabawila, et al. 2021. New COVID-19 cases and hospitalizations among adults, by vaccination status—New York, May 3–July 25, 2021. *Morbidity and Mortality Weekly Report* 70(34): 1150–55. Available online at https://doi.org/10.15585/mmwr.mm7034e1.

Sullivan, Becky. 2021. U.S. COVID deaths are rising again. Experts call it a pandemic of the unvaccinated. NPR (July 16). Available online at https://www.npr.org/2021/07/16/1017002907/u-s-covid-deaths-are-rising-again-experts-call-it-a-pandemic-of-the-unvaccinated.

Todd, Chuck, Mark Murray, and Ben Kamisar. 2021. NBC News poll shows demographic breakdown of the vaccinated in the U.S. WPMI (August 24). Available online at https://mynbc15.com/news/coronavirus/nbc-news-poll-shows-demographic-breakdown-of-the-vaccinated-in-the-us.

Vyse, Stuart. 2015. Guns: Feeling safe does not equal being safe. Skeptical Inquirer Online (December 16). Available online at https://skepticalinquirer.org/exclusive/guns-feeling-safe-does-not-equal-being-safe/.

———. 2021. When QAnon prophecy fails. Skeptical Inquirer Online (February 15). Available online at https://skepticalinquirer.org/exclusive/when-qanon-prophecy-fails/.



PENSAR

The Ibero-American magazine for Spanish-speaking Skeptics Published by the Center for Inquiry

Subscribe Now!

Visit pensar.org/product/suscribirse

[THE PRACTICAL SKEPTIC MICK WEST

Mick West, a writer and investigator, is the creator of the Metabunk.org website and author of *Escaping the Rabbit Hole*. He is a Committee for Skeptical Inquiry fellow.

Jeopardy! and Ideas of Reference

I'm not sure when I first noticed that the universe appeared to be sending me coded messages through *Jeopardy!*, but I know it never stopped, and it never will. I'm not mad. I will explain.

Jeopardy!, for the tiny percentage of you who are unaware, is America's favorite quiz show. Created in the 1970s and airing in its current form on national television for five days a week since 1984, *Jeopardy!*'s gimmick is that the contestants must answer clues, which are phrased as answers, in the form of a question.

My wife and I watch it religiously and competitively, shouting out answers and keeping score. We have been recording which of us won in a little black book since 2016. At some point, we started noticing the strange coincidences. Here's two that stand out.

December 28, 2017: Sue Grafton, a famous author of detective novels, passed away. We'd both met her at conferences a few times and were quite sad. That evening, we sat down to catch up on *Jeopardy!* from a couple of days earlier. One of the first clues was "Ms. Grafton, or what she might do if you plagiarized one of her novels," and the answer, of course, was "Sue." What are the odds?

April 6, 2018: My wife was cooking chicken and rice. I randomly asked her how to say that in Spanish. "*Arroz con pollo*," she said. An hour later, after eating the chicken and rice, we were watching *Jeopardy!* The $600 clue under "New to the Oxford English Dictionary" came up. It was "This, Spanish for 'rice with chicken,'" and the question: "What is *arroz con pollo*?" We looked at each other and laughed. It was an amazing coincidence. I'd asked my wife a question I had never asked her before, and then the same question and answer showed up that same day!

Once we started noticing these coincidences, they seemed to come faster and faster. Sometimes they were trivial, sometimes amazing. I'm a good skeptic, and I know that *Jeopardy!* is not trying to send me messages. It must be coincidence, and yet some of the coincidences seem almost impossibly personal. What is going on?

Ideas of Reference

The notion that "the universe is trying to tell you something" is timeless. Historically, people have seen meaning in the most banal of occurrences. A cat crossing your path was a warning from God. The number of magpies in a tree correlated directly to something that would happen to you in the future.

In psychology, this type of thing is often referred to as "ideas of reference," defined as the belief that random events are specifically related to a person. In more extreme cases, where the belief begins to impact a person's life, it's known as delusions of reference.

Delusions of reference are specifically related to mental illness. They manifest as a deep paranoia and suspicion, often about people around the person but also about the media. Paranoid schizophrenics often report that they are receiving special messages. Historically, the source has been newspapers; more recently, it's been television, and now of course it's the internet. But the milder form of the delusion, *ideas* of reference, is, I think, a pervasive but rarely discussed part of bad thinking. It is a form of cognitive bias that we would do well to understand if we want to help people out of their misconceptions. Ideas of reference permeate conspiracy, mystical, and pseudoscientific communities. "There are no coincidences" is the war cry of the conspiracy theorist. The mystic sees meaning everywhere. Some UFO fans feel that lights in the sky move in response to their thoughts.

Synchronicity

While psychologists now use ideas and delusions of reference as a diagnostic criteria for schizophrenia, it was the work of an early psychologist that unfortunately codified the concept in a way that gave it acceptance. In the 1930s, Carl Jung coined the term *synchronicity* to describe a hypothetical principle that explained meaningful coincidences. The notion of synchronicity was, as Jung described it, essentially magic. He argued that both "meaningful coincidences" and ESP (extrasensory perception) were real phenomena that could not be explained by conventional physics (Jung 1960).

Jung's idea got unexpected support from a hard scientist, Austrian physicist Wolfgang Pauli, one of the pioneers of quantum physics who was often lauded as a successor to Albert Einstein. Pauli's belief seems to have come from the joking observation by his colleagues that equipment would frequently malfunction when he was present, often ruining a complex experiment. They labeled this the "Pauli effect."

Pauli had corresponded with Jung and came to believe that the Pauli effect

was real and an example of the supernatural form of synchronicity. Pauli did not subscribe to Jung's level of mysticism—he was critical of Jung's inclusion of astrology in his synchronicity theories—but he was also working in a field that seemed almost magical. Elements of quantum physics, such as the observer effect and nonlocality, were initially rejected by physicists such as Einstein as being "spooky," so perhaps being an early adopter and developer of those (accurate) theories positioned Pauli to be more accepting of Jung's ideas. [For more on this, see Arthur Miller's book *137: Jung, Pauli, and the Pursuit of a Scientific Obsession*—Eds.] Quantum physics is still frequently misused as a justification of such beliefs.

Both Jung and Pauli were greatly influenced in their belief by coincidences that rival my *Jeopardy!* examples. Pauli had numerous examples of experiments going wrong when he was in town, including one where he just happened to be passing through on a train. There were other events where colleagues pranked him by rigging things to go wrong, and when those pranks failed, that too was ascribed to the Pauli effect, cementing the legend.

Jung relates a famous example where a patient was recalling a dream about a golden beetle. As he listened, he heard a tapping on the window. Turning, he saw a shiny beetle, similar to the one the woman was describing. He opened the window, caught the beetle in mid air, and handed it to the woman, leading to a breakthrough in her therapy.

What *Are* the Odds?

So, what causes these seemingly reasonable and highly intelligent people to reject the obvious explanation of "just a coincidence" and instead leap to some mystical phenomenon where the universe serves up synchronicities perfectly tailored to their individual situations? It boils down to a misapplication of probability. The coincidences seem so improbable, so personal and specific, that it seems impossible that they are *just* coincidences.

When we ask "what are the odds," we generally understand the question in terms of very simple examples. The odds of rolling a four on a standard die are one in six. The odds of winning the Mega Millions lottery after buying one ticket are one in 302.5 million. But what are the odds that "chicken and rice" will show up on tonight's *Jeopardy!*?

We can look at that in some simple ways. Out of 8,490 games, the "Spanish for chicken and rice" question has actually shown up four times. The *Jeopardy!* writers tend to recycle clues and topics every few years. So it's very roughly one in two thousand. Still very unlikely. So why did it happen?

Framing the probability of a synchronicity like this is asking the wrong question. We should not be asking the odds of one specific amazingly improbable thing happening on the show, but rather the odds of *any* (seemingly) amazingly improbable thing happening.

Jeopardy! has 120 clues per game. These sometimes contain multiple things, so we can say that each day there are, roughly, 200 opportunities for a coincidence. What might those 200 things coincide with? Each day my wife and I read and talk about a lot of different things. It's difficult to count, but taking into account reading the news, interacting on Twitter, doing the crossword (a rich source of synchronicity), and just a look at my browser history, we come up with maybe 500 different things over a couple of days.

So, the question now becomes, what are the odds that one of the 500 things we encounter will show up in the 200 *Jeopardy!* entities. This question is similar to the "Birthday Paradox," which you might remember as the surprisingly high probability that two people in a group will have the same birthday. It's not so much about the hits but how improbable it is that you would continually miss.

I'll take 100,000 as my number of entities, essentially an above-average vocabulary. Think of *Jeopardy!* as picking 200 words at random from a 100,000-word dictionary, then I pick 500 more. The odds that I will miss their 200 with any one of mine are high: 99,800 out of 100,000. But to miss with two, we have to (roughly) square that, then cube it for three. Rapidly the odds of missing decrease, so if we have only 350, the odds are even, and at 500 it's 2:1 in favor of a synchronicity.

Every game there's a *Jeopardy!* synchronicity of some sort. Look and you shall find. Most of these coincidences are not particularly interesting, but my wife and I still notice something nearly every day. Sometimes the oddest thing we've discussed that day will come up—seemingly a true synchronicity—but in reality that will happen once every 300 games, or about once a season, which it does. It is inevitable.

The Synchronicity Lottery

The person who wins the Mega Millions with a single ticket might consider it a miracle. But *someone* had to win eventually. Likewise, because ten million people watch each episode of *Jeopardy!*, someone has to have the most amazing set of synchronicities imaginable—literally ten million times more improbable than mine. They may well feel the universe is trying to tell them something. But it had to happen to *someone*.

Jung also would have a similar intersection of real-world random events (like the beetle) and his patients' dreams. He kept playing and eventually won the lottery when the beetle bumped against his window. It was just random chance, but he interpreted it as significant. Someone has to win. If we take all the physicists in the world, one of them is going to have the worst (but still random) luck regarding experiments going wrong. Pauli bought a lot of tickets, and he won that lottery. The events that convinced him of synchronicity's reality would have happened to someone. The Pauli effect was a contrivance. We might as well invent a "Lustig effect" after Richard Lustig, who won the lottery multiple times—without any magic involved.

Synchronicity drives the confirmation bias feedback loop behind ideas of reference. If we understand how it works, it becomes easier to understand how *some* people might fall for the belief that there are no coincidences, or that magic works, or even that the universe is sending them messages via *Jeopardy!*. ■

Reference

Jung, Carl. 1960. *Synchronicity: An Acausal Connecting Principle*. Princeton, NJ: Princeton University Press.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of thirteen books, including *Big—If True: Adventures in Oddity*.

Secrets of Psychic Surgery

Q: **I know that skeptical explanations for so-called "psychic surgery" involve sleight of hand, making blood and tissue appear on a patient, but how much blood could one successfully palm in the hand for such an act? In the video I'm providing, there seems to be quite a bit of blood on the person's spine. Could a person really palm enough blood with one hand to make such a mess?**

—Tony J.

A: Psychic surgery is performed around the world, primarily in Torrid Zone countries, including Brazil and Indonesia. In the performance, the healer appears to reach into a patient's prone body and remove diseased tissue, usually in the stomach area and often without a real incision. It's quite a spectacle and is accompanied by blood (or what *appears* to be blood—samples are rarely if ever tested) and small bits of gore. The patient feels no pain from the procedure, which makes it all the more impressive to everyone involved, until you realize that there's no reason they *would* feel pain—for the same reason that a magician's assistant feels no pain while being "sawed in half." Skeptics, magicians, and skeptical magicians have debunked psychic surgery for decades, but the practice continues, especially in developing countries with limited access to medical care.

I examined the video Tony sent me, titled "El Hermanito, hijo de Pachita (Sanación espiritual)" available on YouTube at https://tinyurl.com/4etuerk7 (see Figure 1). The video at the time stamp he supplied seems to show a famous Mexican healer known as Pachita, who conducted many psychic surgeries, allegedly guided by the spirit of Aztec emperor Cuauhtémoc (ca. 1497–1525)—whose own medical qualifications are equally opaque.

I replied: You asked about how much "blood" a psychic surgeon or magician could successfully palm for a performance, and the answer is "a lot"! But before I get into that, I want to highlight that the quality of the image is very poor (it's a low-resolution video of a TV show that features an old black and white photo). So it's at best third-generation, and details are very poor. Any time you make a photographic copy—and especially a copy of a copy or a copy of a copy of a copy—the process both adds and removes details. This is important to consider in skeptical investigation, because, as Ray Hyman has cautioned, before trying to explain *how or why* something happened, be sure that it *did* happen. A seemingly mysterious dark or light spot in a duplication, for example, may not even appear in the original, which is why it's best to seek out original sources when possible. Before spending weeks or months trying to figure out what a bright spot in an old photo might be (a ghost or UFO?), look for the film negative to see if it's just a developing error or speck of dust. Of course, each copy also introduces an opportunity for someone to add fakery (though I see no indication of that in this case).

Making matters worse (from an investigative point of view, though better from a believer's), the photograph is a black and white image (which by definition contains less information than a color photo) and was taken in low light, with a flash, and thus inherently (though perhaps incidentally) obscures potentially important details due to limitations of the situation. This is of

Figure 1. A woman performs psychic surgery in a YouTube video.

course true for most mysterious photos and videos—of anything from Bigfoot to UFOs—characterized by their low light, low resolution, and poor focus.

The point is that trying to determine anything with any certainty from such a poor image is a fool's errand. Nevertheless, there are some clues. I am not a magician and have not personally faked psychic surgery in front of an audience, though I have some insight gleaned from articles, videos, and conversations with the late James "The Amazing" Randi, who did this many times, including for national audiences (see Figure 2).

Psychic surgeons have several advantages over magicians doing the same stunt, including an audience of the faithful who are strongly motivated to believe the performance is authentic. A magician is telling you it's a trick, so the audience is expecting deception and thus looking for signs of it. Then there's the setting: not a clear, clean, well-lit stage or table with cards or coins in full view but a bed and a patient with clothing (on both the healer and the patient) and sheets, pillows, and countless places that could easily hide a small pouch. Palming an object or packet of red ink, animal blood, or anything else under those conditions would not be difficult, and with practice can look very convincing. It's revealing that the tissues removed are invariably small and easily palmed. Presumably, if psychic surgery is real, there's no reason a ham-sized heart, liver, or lung couldn't be removed, displayed, healed, and then replaced. Even an ounce or two of blood can appear to be a much greater quantity than it really is, because it runs and spreads.

Tony followed up asking if the person taking the picture at that moment would see things as clearly through the camera lens as the picture would turn out, suggesting that the eyewitness report corroborates or validates the image. I replied that the human eye is much more sensitive than any camera, but it needs light. What's in the photo would not be seen as clearly by the photographer, or anyone else there, because it's illuminated by the flash. If anything, the flash would make it harder, not easier, to see what was going on when the photos were taken. Otherwise, it's a dark room with many opportunities for something to be hidden in hands or folds of sheets or anywhere else. Another factor is that the human eye is not like a camera because it has a brain behind it, directing the photographer's attention. A person, whether looking through a camera lens or not, is typically focusing on one specific aspect of what they're seeing—the dark mass under some trees, the odd light in the sky, the psychic healer's fingers, for example. Countless ghost and mysterious photos have been revealed as the result of photographers not paying attention to what's in the background and the context (see, for example, revelations about the famous Solway Firth "Spaceman" photo debunked by folklorist David Clarke and Kenny Biddle's article "Ghostly 'Black Monk' or Random Tourist?" in the September/October 2018 Skeptical Inquirer). Thus, on one hand the human eye is far more sensitive than a camera, but it's also far more susceptible to attention and perception biases.

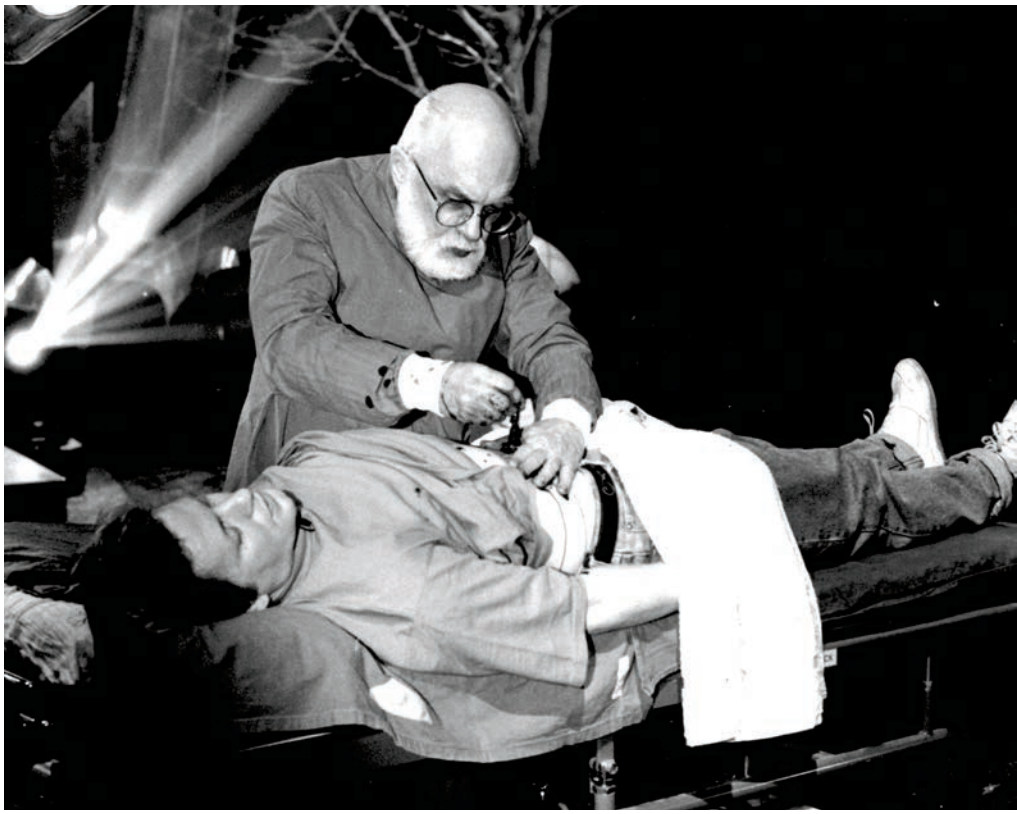


Figure 2. James "The Amazing" Randi uses sleight of hand to duplicate psychic surgery on his *Open Media* series for ITV in 1991. (Wikimedia Commons)

The real danger in psychic surgery is not the procedure itself (being an illusion, it's harmless), but instead that the patient and audience will believe it's real and not seek effective medical care. One researcher who met with psychic surgeons in Brazil wrote of a "Dr." Hirota, who "has been practicing for over 20 years. He usually sees patients who come to his clinic in the mornings and he claims to treat 1,000 to 2,000 patients daily between 9 AM and 12 noon" (Omura 1997). Allowing for exaggeration, this one faith healer alone would be responsible for hundreds of thousands of sick and injured patients not seeking medical care. Given the prevalence of such people in Brazil (see the review section in this issue for one infamous example), there are easily tens of millions of victims. ■

Reference

Omura, Y. 1997. Impression on observing psychic surgery and healing in Brazil which appear to incorporate qi gong energy & the use of acupuncture points. *Acupuncture & Electro-Therapeutics Research* 22(1): 17–33. Available online at https://doi.org/10.3727/036012997816356815.

Schrödinger's Bin Laden: The Irrational World of Motivated Reasoning

The rationale behind even seemingly reasoned decisions is often something subconsciously emotional and ideological—with harmful implications for our collective wellbeing.

DAVID ROBERT GRIMES

The early twentieth century in Russia was a tumultuous time. The October Revolution of 1917 saw revolutionary Bolshevik forces establish the world's first communist nation. This huge transition created political vacuums, eagerly filled by power-hungry and often unscrupulous men. Joseph Stalin is doubtlessly the most infamous occupant of this rogues' gallery. His vaulting ambition was apparent to the ailing and wary Vladimir Lenin, who disavowed Stalin, recommending Leon Trotsky as his heir. Yet following Lenin's death, Stalin outmaneuvered all rivals, consolidating absolute power. Trotsky was forced into exile and eventually bludgeoned to death in Mexico with an ice-axe on Stalin's orders. Stalin's brutality is well known, but more obscure is the story of another ambitious man of the era—Trofim Lysenko.

Lysenko's passion was plants rather than politics. While his peers were shaping the revolutionary effort, he studied seeds in Kyiv under his mentor, Nikolai Vavilov. Their primary interest was investigating conditions influencing wheat yields. This issue acquired political urgency once the new Russian leaders began a forced transition from an agrarian economy to an industrial one. Affluent "kulak" peasants were eradicated as "class enemies," their fertile land taken over by collective farms. Chronic mismanagement ensued, and famines erupted all over Russia due to Soviet ineptitude.

Lysenko's 1928 announcement of a new way to hugely increase crop yield, dubbed "vernalization," was music to the Party's ears. Inspiring stories of ingenious workers solving practical problems by wits alone were a trope of Soviet propaganda, so this agronomist from peasant origins without any formal scientific training outsmarting a bourgeois scientific establishment was widely embraced. Bestowed with political and scientific awards, he was elevated up the Party hierarchy. Such praise was premature; Lysenko's lack of scientific training translated into poorly controlled, subpar experiments. Nor was he above bolstering his heroic image with fabricated data.

Still, Lysenko was an unimpeachable Party darling, and the audacity of his claims increased steadily. He insisted that the offspring of seeds treated with his process would inherit wondrous properties, allowing wheat to transmute into barley. This caused consternation to biologists, as it pivoted on Lamarckian evolution. This obsolete theory suggested acquired characteristics of an organism could be passed down to descendants, so a plant plucked of leaves might have leafless offspring. Biologist Julian Huxley pithily observed that "if this theory is correct, it would follow that all Jewish boys would be born without foreskins."

Unlike Lysenko, most Russian botanists and biologists were educated prior to the revolution. They were

familiar with Charles Darwin's theory of evolution, which provided a richer explanation and had passed the trial-by-fire of intense experimentation. Yet Lysenko did not acquiesce one iota to these concerns. Unable to refute them, he decried critics as rejectors of Marxism, denouncing biologists as "fly-lovers and people-haters." After this outburst, Stalin himself was the first to stand in ovation, bellowing "Bravo, Comrade Lysenko. Bravo."

Emboldened further and with explicit approval from Stalin himself, Lysenko began melding his agricultural ideas with communist thought. The entire field of genetics became his primary target; an interpretation of Marxist doctrine suggested human characteristics could themselves be changed by living under communism. Acquired improvements would be inherited by subsequent generations, creating a heroic "new Soviet man." This was a far more politically tractable belief than the alternative, and Lysenko thus rejected Darwinism itself as anticommunist.

As World War II consumed Europe, Lysenko began purging scientists who contradicted his grandiose claims. Arrested on overblown charges, his mentor and early champion Vavilov ultimately died in prison from malnutrition. In 1941, Germany attacked Russia, putting Lysenko's crusade temporarily on ice. At the war's end in 1945, Lysenko still held dictatorial sway with the Party—but closer evaluations of his work by others began to reveal unjustified and blatantly falsified claims. Apprehensive of his position, Lysenko implored Stalin for support, promising to increase the country's wheat yield tenfold. Despite ample evidence this was impossible and Lysenko incompetent, Stalin bowed to this much-vaunted genius of the proletariat, bestowing the entire political machinery of the Soviet Union on Lysenko.

Immediately, Stalin declared genetics "fascist," a "bourgeois perversion." The entire discipline was prohibited, with Lysenkoism the only "politically correct theory." The Party decree attesting to this was edited by Lysenko and Stalin himself. All genetics research was forbidden, further discussion outlawed. Researchers across the USSR were fired, their work publicly condemned. Approximately 3,000 scientists were rounded up and executed or sent to gulags. Persecuted scientists were replaced by incompetent sycophants loyal to Lysenko. To make matters worse, this backward agricultural policy plunged the country deeper into starvation.

This had a chilling effect on scientific discourse. It wasn't until 1964 that the scientific establishment in Russia could finally mount an offensive, when nuclear physicist Andrei Sakharov blamed Lysenko for "the shameful backwardness of Soviet biology, the dissemination of pseudoscientific views, for adventurism, for the degradation of learning, and for the defamation, firing, arrest, even death, of many genuine scientists." In concert with this damning sentiment, reports emerged showing that Lysenko and his acolytes had falsified and misconstrued evidence. Bereft of political sponsors to protect him now, the death knell sounded for his stranglehold on Soviet science.

The state press, which had once heralded his genius, now damned him absolutely. Lysenko retreated into obscurity, dying quietly in 1974. His cult of personality had stifled advances in genetics, biology, and medicine across the Soviet Union. His peaceful end was a stark contrast to that of the scientists whose destruction he had authored in his violent purges. The Lysenko affair was, in the words of scientist Geoffrey Beale, "The most extraordinary, tragic and in some ways absurd, scientific battle that there has ever been."

But Lysenko's story is more than just the hubris of one man; it tells us something about the human condition. The very reason his work was so revered was because it jibed with an ideological stance, an all-too-human psychological error known as motivated reasoning, where evidence—instead of being evaluated critically—is deliberately interpreted in such a way as to reaffirm a preexisting belief. It is an emotionally driven, inherently biased form of decision making. It demands impossibly stringent standards for any evidence contrary to one's beliefs, while accepting uncritically even the flimsiest evidence for any ideas that suit one's needs. Rather than rationally evaluate evidence that might confirm or deny a belief, motivated reasoning uses our biases to look only at evidence that fits what we already believe and dismiss that which unsettles us.

Motivated reasoning is closely related to confirmation bias: our tendency to seek, remember, and frame information in a way that agrees with our preconceived beliefs and worldviews, while minimizing contradictory information. The idea that we have an internal gatekeeper predisposed to filter information is not new; historian of Greek antiquity Thucydides noted the "habit of mankind to entrust to careless hope what they long for, and to use sovereign reason to thrust aside what they do not fancy." This observation is buttressed by modern psychological investigations that have formally examined our propensity to placate ourselves with convenient fictions. Yet there is a high cost associated with clinging to falsehoods, however comforting—so why would we do this?

This question captivated pioneering psychologist Leon Festinger, who postulated that simultaneously holding two or more contradictory beliefs might lead to mental agitation. He termed this *cognitive dissonance*, the discomfort a person feels when encountering information that conflicts with ideas they already hold. When confronted with clashing information, we endeavor to quell this discomfort. We could accept that our preconceived notions may be flawed or incomplete, refining these in the light of new evidence. But altering ideological leanings is cognitively expensive; an easier option is simply to deny reality to preserve our beliefs. In Festinger's paradigm, motivated reasoning staves off discomfort from conflicting information, "motivating" us to accept soothing falsehood over challenging realities.

In the early 1950s, Festinger sought a means to test his hypothesis, and an intriguing article in his local paper caught

his attention. It concerned a cult led by Chicago housewife Dorothy Martin, who was adamant that she received communications from the planet Clarion through automatic writing. These alien missives revealed that the world would end on December 21, 1954. Martin had previously been involved with the Dianetics movement (later known as Scientology) and cannibalized the B-movie science fiction aesthetic. Martin declared that on the eve of destruction, flying saucers would spirit the faithful to Clarion while a great flood hit Earth. Her movement sought spiritual clarity and salvation, adopting a name reflective of this: the Seekers.

The Seekers were unusual among the chorus of American apocalyptical groups, being both uninterested in proselytizing and averse to engaging with the media. Even so, Martin was surrounded by a band of devotees who believed so strongly in her proclamations that they had surrendered not only their positions and possessions but even their marriages and families. Recognizing a unique opportunity, Festinger arranged for students to join the group undercover to observe how the Seekers would deal with the disconfirmation of their beliefs.

Throughout December 1954, they prepared for the imminent destruction, awaiting communication from Clarion, which came through Martin at 10 a.m. on December 20. Assuring them they would be saved and whisked into space, the aliens decreed they should remove all metal—including bra-wiring, zippers, and adornments. Subsequent communications detailed a series of passwords the saved needed to board the rescue vessel, scheduled to arrive at midnight. At 11:15 p.m., Martin ordered her followers to don their coats, and as midnight approached, they huddled together in silence, awaiting salvation.

But as midnight arrived, nothing happened. One clock read 12:05, while another read 11:55. With mounting anxiety, they agreed that the earlier clock must be correct. They continued waiting for it to strike midnight, sick with anticipation. But as the hands of the clock aligned, no savior emerged. Over the next hours, mournful agitation engulfed the room. Cataclysm was due to devour Earth by 7 a.m. By 3 a.m., they desperately picked apart the words of the prophecy, looking for hidden symbolism they had perhaps overlooked, but attempts to rationalize rang hollow even to themselves. By 4 a.m., some were in tears while others sat listlessly in shock. This dejected mood didn't linger long; at 4:45 a.m., Martin delivered a new transmission from Clarion: "Mighty is the word of God—and by his word have ye been saved—for from the mouth of death have ye been delivered and at no time has there been such a force loosed upon the earth."

The Seekers were ecstatic, convinced they had saved Earth from doom. They rationalized away the abject failure of their prophecy, instead painting it as a glorious thing. Completely reversing their prior position, they became vocal evangelists, urgently seeking media attention. They were not the first—nor last—group to persevere despite a failure of prophecy. The Millerite movement believed Jesus Christ would reemerge in the year 1844, dubbing his nonappearance the "great disappointment." Yet the Adventist churches that arose from Millerite beliefs today have roughly 22 million followers worldwide. That people can become more fervent believers after tenets of their faith are explicitly refuted seems strange but was precisely what Festinger predicted (Festinger et al. 1956). He noted, "A man with a conviction is a hard man to change. Tell him you disagree and he turns away. Show him facts or figures and he questions your sources. Appeal to logic, and he fails to see your point."

This is not solely a failing afflicting the religious; controversy over climate change is underpinned by a similar rationale. The perception that climate change is scientifically contentious is widespread but mistaken—the scientific consensus is simply overwhelming that we are drastically altering our climate. The mechanism of action has been known for over a century; French polymath Joseph Fourier hypothesized a human effect on climate in 1827, and the effect of greenhouse gases were demonstrated experimentally by Irish physicist John Tyndall by 1864.

That humans can affect climate is no surprise; what is surprising is just how fast we're doing it. Analysis of millennia of temperature and atmosphere records embedded in ancient ice-cores show our current rate of warming is hundreds of times in excess of anything in geological history. More alarmingly, while at no point during any previous glacial or interglacial period has the CO_2 concentration level reached as high as 300ppm (parts per million), we surpassed the 400ppm threshold in 2016, with up to 600ppm possible in coming decades. This is most distinctly not natural variation. Nor can we evade responsibility by postulating that this is unrelated to human activities—chemical signatures released from fossil fuels point to our guilt as readily as fingerprints on a smoking gun. The incontrovertible conclusion is that we are driving the destruction of our environment.

While evidence for this is virtually incontrovertible, a sizeable contingent reject this utterly. Self-proclaimed "climate skeptics" deny that climate change is happening or insist we are not responsible. But these ostensible "skeptics" engage in a calculated misnomer. Scientific skepticism is a vital element of the scientific process, crucial to probing whether a hypothesis is supported by evidence. Climate skeptics by contrast ignore empirical evidence, rendering their position untenable. This isn't skepticism; it is unadulterated denialism, the very antithesis of critical thought. Accordingly, such individuals are climate change *denialists*, not skeptics—a definition that encompasses unwarranted doubt alongside outright rejection.

A deficit of scientific validity seems no impediment to this veritable brigade of underinformed armchair experts, however. Lurking on comment threads worldwide, they lambast climatologists and journalists communicating this reality. Such disdain is not confined to the foaming underbelly of social media; the editorial position of many tabloid newspapers is denialist, the Rupert Murdoch press being especially vehe-

ment. The schism is apparent in politics too, perhaps most obviously in America, where a 2016 survey found a third of Congress members were denialists. The Republican Party is unique among major conservative groups worldwide as the explicitly denialist party. The insistence by former President Donald Trump that climate change was a conspiracy by the Chinese to hobble American industry is but one egregious example.

Given that the weight of scientific evidence is so strong against these claims, why do they muster such unrelenting support? Naively, we might assume the problem is simple misunderstanding. Certainly, increasing average global temperature can have counterintuitive repercussions, such as extreme cold snaps. Were this the problem, the solution would be to articulate scientific details more clearly and more often. Yet this well-meaning "information-deficit" approach hinges on the presumption that the intended audiences base their positions on evidence alone.

Sadly, data suggest that rejection of science is often not motivated by reason but ideology. Climate denialism is far more common among political conservatives with traditional values. In a fantastically titled 2013 study, "NASA Faked the Moon Landing—Therefore, (Climate) Science Is a Hoax: An Anatomy of the Motivated Rejection of Science," Lewandowsky et al. found that subjects subscribing to conspiracist thought tended to reject all scientific propositions they encountered, while strong free-market worldviews tended to reject only scientific findings with regulatory implications—namely, climate science.

Political alignment itself is the biggest predictor of climate change denial, and evidence suggests that the stronger one's belief in the free market, the more likely one is to dispute climate change. For those who actively distrust market regulation, the existence of climate change presents an ideological challenge. Accepting that human activity has consequences for others is cognitively difficult, because it forces believers to refine nuances of their personal philosophy. But for many, it is simply easier to quench intellectual discomfort by retreating into naked denial, ignoring or attacking evidence that conflicts with deeply held beliefs.

If one accepts human-mediated climate change, then supporting mitigating action should follow. But the demon of regulation is a bridge too far for many libertarians. Given that climate change affects everyone, whether they consent to it or not, then unregulated use of natural resources infringes the property rights of others, rendering it ideologically equivalent to trespass. When faced with this dilemma, some free-market advocates resolve the inevitable dissonance by simply denying the reality of climate change rather than acknowledging that the axiom they cling to may require revision.

While ideological blindness on climate change isn't solely the preserve of free-marketers, constructive solutions can be found only when we acknowledge reality; problems cannot be rectified if unrecognized. Denialists fall at the first hurdle, dismissing the problem and stifling vital dialogue. Like Festinger's UFO cult, they are unwilling or unable to let their position evolve with evidence. Unable to justify their contention, they resort to shouting down uncomfortable facts that clash with their perceptions, drowning out the intrusions of reality on their perfect ideology. Sadly, this sustained assault on reason has serious implications for the future of our very planet.

Ideological lenses distort how we see the world; an infamous experiment (Kahan et al. 2013) initially gave subjects a neutral numerical problem about whether a skin cream could

alleviate a rash. Unbeknownst to the subjects, they had been covertly stratified by political alignment into conservative and liberal cohorts. The neutral question proved difficult for everyone, with 59 percent getting the wrong answer. With the mathematically capable identified, the researchers asked a similar problem. But this time, it concerned a subject teetering at the very brink of the American political fault line: gun control. Random data generated sometimes indicated gun control decreased crime and sometimes the opposite. Now firmly politicized, problems were randomly distributed among liberals and conservatives.

The results demonstrated something extraordinary: Liberals were remarkably effective at solving it when data suggested gun control reduced crime, but when confronted with the converse, their mathematical skills abandoned them; they tended to answer incorrectly. Conservatives exhibited precisely the same pattern in reverse: able to solve the problem only when it suggested lax gun laws reduce crime. One's mathematical acumen wasn't enough to overcome the impact of partisanship. The alarming inference from this is that ideological motivations skew our very ability to reason. But why?

The answer might be our propensity to engage in identity-protective cognition; we do not separate our beliefs from ourselves—to some extent they define us. Accordingly, it is a psychological imperative to protect this idea of who we are. We find it immensely difficult to differentiate our ideas from our sense of self, too often condemning us to clutch at wrongheaded positions with dogmatic zeal, unwilling to countenance alternatives lest they threaten our very identity.

Consider too the consequences for people who defy their group identities and the unquestioned beliefs and assumptions inherent therein. We tend to inhabit echo chambers of opinion and ideology reflecting our own. This is extremely apparent in emotive subjects, whether religion, politics, or beliefs. This collective subscription to certain views reinforces ideas until they become unquestioned orthodoxy. Any deviation from these ideas can come at a high social and personal cost—including ostracization. To question aspects of a belief is often conflated with being treacherous to that view, and it risks making one a pariah.

Curiously, cognitive dissonance seems to be somewhat selective. Researchers found that conspiracy theorists had a surprising ability to hold two mutually exclusive beliefs simultaneously. In one study, the more participants believed that Princess Diana had faked her own death, the more they believed she was murdered. Similarly, another study found that the stronger a subject's belief that Osama bin Laden was already dead when U.S. Special Forces raided his compound in Pakistan, the deeper their belief he was still alive. Somehow, they readily accepted some bizarre Schrödinger's Bin Laden, simultaneously existing in both an alive and dead state. The reason this caused no conflict to believers is that the specifics of the beliefs themselves were inconsequential—a conspiratorial narrative itself was enough to protect their worldview. As the researchers concluded, the "nature of conspiracy belief appears to be driven not by conspiracy theories directly supporting one another, but by broader beliefs supporting conspiracy theories in general" (Wood et al. 2012).

The alarming reality is that people tend to believe what ideologically appeals to them, filtering out information conflicting with deeply held beliefs. This afflicts all of us to some degree, and we need to be actively aware of this predilection to have any chance of overcoming it. What feels to us like a rational position might not be anything of the sort. Often, it could instead be an emotional decision dressed in the borrowed garb of rational thought, entangled with the very fabric of how we define ourselves. This makes us resistant to changing our minds, even when the available data urges it.

As Jonathan Swift once observed, "Reasoning will never make a man correct an ill opinion, which by reasoning he never acquired." Ultimately, clinging to irrational beliefs is detrimental. Whether the issue is climate change, health policy, or even politics, we need to be able to evaluate available information critically without the distorting lens of ideology coloring our perception. While we may hold incredibly strong personal convictions, reality doesn't care one iota for what we believe. And if we persist in choosing ideology over evidence, we endanger ourselves and others. ■

Abridged by the author from his book *Good Thinking: Why Flawed Logic Puts Us All at Risk and How Critical Thinking Can Save the World* (The Experiment Publishing, 2021).

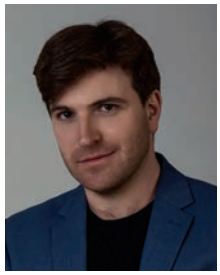
References

Festinger, L., H.W. Riecken, and S. Schachter. 1956. *When Prophecy Fails: A Social and Psychological Study of a Modern Group That Predicted the Destruction of the World*. New York, NY: Harper-Torchbooks.

Kahan, D.M., E. Peters, E.C. Dawson, et al. 2013. Motivated numeracy and enlightened self-government. *Behavioural Public Policy* 1(1): 54–86.

Lewandowsky, S., K. Oberauer, and G.E. Gignac. 2013. NASA faked the moon landing—therefore (climate) science is a hoax: An anatomy of the motivated rejection of science. *Psychological Science* 24(5): 622–633.

Wood, M.J., K.M. Douglas, and R.M. Sutton. 2012. Dead and alive: Beliefs in contradictory conspiracy theories. *Social Psychological and Personality Science* 3(6): 767–773.



David Robert Grimes is a physicist, cancer researcher, and author. He is affiliated with Dublin City University and Oxford University. His work encompasses everything from how tumors use oxygen to the impact of disinformation and conspiracy theory. He has a strong focus on public understanding of science and medicine, contributing to PBS, BBC, *The New York Times*, *The Guardian*, *Scientific American*, *The Irish Times*, and the *Financial Times*. He was corecipient of the 2014 *Nature*/Sense About Science Maddox prize, and his first book, *Good Thinking—Why Flawed Logic Puts Us All at Risk and How Critical Thinking Can Save the World* is out now from The Experiment publishing. He can be found on Twitter @drg1985 and on Instagram @david_robert_grimes.

Teach Skills, Not Facts

If the purpose of general education science is to teach students science literacy and critical thinking, why do most courses teach content? Is there a better way?

MELANIE TRECEK-KING

The moment is burned into my brain like a flashbulb memory: I was teaching Introduction to Biology, a general education class for students not majoring in science. It was near the end of the semester, and, having just covered basic genetics, I was lecturing on the stages of mitosis.

My students looked completely deflated.

I had been teaching general biology for over a decade, eager to convince my students that science is awesome, that it improves the quality of their lives, and that science literacy is essential in today's world. Biology is the study of life, after all, and science is one of the most reliable ways of knowing. I thought I had a solid case.

Unfortunately, few of my students seemed to agree with me. I wouldn't (necessarily) say they hated science, but they were certainly sciencephobic.

Too often, non-majors biology is taught like a watered-down version of the introductory course taken by majors. After a very brief introduction to the scientific method, students progress through a survey of the major concepts in biology: molecules, cells, genetics, organisms, and evolution.

I was never a fan of the "baby bio" approach for students not majoring in biology and was constantly on the hunt for something better. I tried countless textbooks, labs, and case studies and frequently included issues relevant to students' lives to teach important concepts. And yet, my moment of crisis came after we had used genetics and evolution to test the concept of human "races" and were in the process of applying mitosis to cancer.

I tried to make it work. I really did.

But that moment hit me like a ton of bricks. My students were not going to remember, let alone use, what they were learning past the exam. Worse, the fears and anxieties they associated with science would continue to haunt them. I had squandered their one opportunity to gain the empowerment that comes with science literacy and critical thinking. (Like I said … a ton of bricks.)

Why General Education Science?

A common complaint I heard from students was that they shouldn't need to take a science class because they're majoring in business, literature, or art … so why should they spend their time (and money) learning about the structure of cell membranes or protein synthesis? And honestly, I could see their point. As much as I find electron transport chains

fascinating and worthy of study, I knew what students were *really* learning was how to memorize information to regurgitate on an exam.

So here it was: my moment of truth. I asked myself: Why are nearly all undergraduate students, regardless of major, required to take science? The obvious answer seemed to be to foster science literacy and critical thinking … but what does that mean?

Thankfully, I stumbled upon a quote by Carl Sagan: "If we teach only the findings and products of science—no matter how useful and even inspiring they may be—without communicating its critical method, how can the average person possibly distinguish science from pseudoscience?"

He was right. Science is so much more than a bunch of facts to memorize. It's a process. It's a way of learning about the world, of trying to get closer to the truth by subjecting explanations to testing and critically scrutinizing the evidence. It's not just *what* we know; it's *how* we know.

Basically, science is good thinking.

Scientifically literate people understand scientific reasoning and are able to draw reasonable conclusions from the available evidence. They are able to evaluate hypotheses, arguments, conclusions, and their own beliefs. And they're aware of the cognitive biases and logical fallacies that may impact our ability to evaluate evidence and draw fair conclusions.

The good news is that science classes are theoretically the perfect vehicle to teach science literacy and critical thinking, skills that can empower students to make better decisions and inoculate minds against the misinformation and disinformation all too prevalent in our current society.

The bad news is that most general education science classes instead focus on facts. But facts are forgettable and widely available. Plus, the facts they learn in class might even have an expiration date. After all, science is a never-ending process of weeding out bad ideas and building on good ones.

If we don't teach students the process of science, how will they be able to differentiate between reliable and unreliable claims? Instead of facts, students (and all citizens) need the essential skills of science literacy and critical thinking that will help them navigate today's world … and tomorrow's.

The global pandemic has made clear the importance of understanding the nature of scientific inquiry and the value of science to society. Between fake news, alternative facts, science denial, snake oil cures, and conspiracy theories, it's also made it clear that we need to be doing a better job of teaching our fellow Americans how to think critically (Harrison 2021).

I will fully admit to being part of the problem. I had assumed that, because critical thinking is at the heart of scientific inquiry, I was teaching it in my classes. And of course I was teaching science literacy! I honestly didn't realize how wrong I was. I wonder how students who took my "baby bio" course all those years ago made sense of the pandemic and if the facts I taught them provided them with the tools to understand coronaviruses or mRNA vaccines or hydroxychloroquine. The world changed. Knowledge changed. They needed skills for the future, and I had failed them.

I started digging to see what other educators were doing and found a team at Sam Houston State University who created an interdisciplinary general education science course designed specifically to teach science literacy and critical thinking (Rowe et al. 2015). I contacted the study's authors, who shared their wisdom and kindly allowed me to steal parts of their curriculum. I was off to the races!

Rethinking General Education Science: A Backward Design Approach

After concluding that "baby bio" wasn't meeting our goals for non-science majors, I convinced my institution to replace it with a new course that focuses less on the findings of science and almost exclusively on science literacy and critical thinking. The goals of the course include evaluating evidence for claims to determine how we know something and learning to recognize the characteristics of good science by evaluating bad science, pseudoscience, and science denial. The entire course is centered around empowering students to make better decisions to help them live better lives.

Unlike most science classes that start with the scientific method, I begin with witches. Centuries ago, being accused of witchcraft and "confessing" under torture were sufficient evidence to convict and sentence a person (usually a woman) to death. Because most students today don't believe that diseases and storms are caused by witches casting spells, they are able to more skeptically examine the supposed evidence and explore why people at the time had such strong beliefs. We like to think of ourselves as rationally following evidence to a conclusion, but more often than not, we form beliefs through irrational ways and look backward for justifications. Our discussion naturally leads to epistemological questions, such as how we know what we know and how knowing is different than believing.

Richard Feynman famously said, "The first principle is that you must not fool yourself, and you are the easiest person to fool." Unfortunately, most of us think we're immune! To prove to students how easily they can be fooled, I give them astrology-based "personality assessments," which they nearly all report as being highly accurate. Once they learn everyone received the same results, they realize they've been conned. After I apologize and explain why I lied to them, they're more open to learning skills that can protect them from being fooled, such as skepticism. While many students confuse skepticism with cynicism or denialism, true skepticism is simply proportioning beliefs to the evidence and is therefore an essential characteristic of science.

To equip students with the skills necessary to evaluate claims, I provide them with a toolkit, appropriately summarized by the acronym FiLCHeRS (Lett 1990). The principles in FiLCHeRS (Falsifiability, Logic, Comprehensiveness of evidence, Honesty, Replicability, and Sufficiency of evidence) encapsulate the essence of the scientific method. Through repeated practice, students learn to use scientific reasoning to evaluate claims, because pseudoscientific and unreliable claims fail at least one of the rules in FiLCHeRS.

Next is one of the most important lessons in the course: the limits of perception and memory. For many, personal experiences are the best way to "know" something. Whether it's believing in UFOs because they've "seen" one or that homeopathy is effective because it "worked" for them, we often fail to recognize that our perceptions are subjective and highly biased and that our memories are flawed and unreliable. Understanding this is essential for knowing why anecdotes, including one's personal experiences, are unreliable evidence.

We then dive into metacognition, or thinking about thinking. Our brains have to process a lot of information, but they're lazy, so much of it is done on autopilot. This fast, intuitive thinking uses mental short-cuts (i.e., heuristics) that can lead to errors (i.e., cognitive biases) that deviate our thinking from reality. Ultimately, the goal is to teach students how to think better by being aware of how they are thinking and recognizing the limits of what they know.

After students have a better appreciation of how flawed their thinking can be and the importance of skepticism, we turn to information literacy. Information affects how we think and the decisions we make, yet it can be difficult to distinguish reliable from unreliable information. In fact, we are most likely to fall for misinformation when it confirms what we already believe and/or triggers strong emotions. Thankfully, the concepts covered in class thus far provide students with the background knowledge to skeptically evaluate sources and claims online.

While many general education science courses teach students how to read primary literature, I don't think that's helpful or necessary. Students should understand the importance of peer review to the process of science, but it's unrealistic to expect anyone, especially someone who has only taken one or two undergraduate science courses, to rely on jargon-rich articles published in professional journals for making decisions in their daily lives. Instead, it's important that students recognize the limits of their knowledge and learn how to be good consumers of information more broadly.

By the time I introduce the process of science, students have an understanding of why science is reliable and necessary. To reiterate: science is good thinking. We are all biased and irrational, and at its core, science is a way of knowing that recognizes and corrects for our biases. Consider the double-blind, randomized controlled trials used to test new medications. Every aspect of these studies—such as the blinding, use of placebos, and random sampling—are designed to correct for the cognitive biases that can interfere with determining whether the drug actually works. By building up a justification for science, the logic of the scientific process falls into place.

Speaking of the scientific method, there isn't one, and we do our students a disservice when we teach it as such. While most textbooks start with a recipe-like formula, from observation to hypothesis to experiment, most science doesn't follow these steps. Science is a community of experts using diverse methods to gather evidence and scrutinize claims. There are endless ways to do science. For example, not all science uses controlled experiments. Observational science, such as discovery science, historical science, and epidemiology, collects data in the "real world." Importantly, different types of studies provide different types and qualities of evidence. A broader understanding of the nature of science, which is essentially evidence-based thinking, equips students to evaluate the evidence for any particular claim.

Throughout the course, lectures, quizzes, case studies, and assignments are used to explore real-world issues relevant to students and provide opportunities to practice evaluating claims. Topics include ghosts, psychics, fake news, fad diets, crystal healing, conspiracy theories, Bigfoot, the MMR vac-

STUDENT TESTIMONIALS

"For most of my life, I assumed skepticism was having a negative outlook on life. Now I know it is actually a vital tool we should all use while taking in information in our daily lives. I think the most valuable thing I've learned is that evidence is vastly underrated and overlooked in most people's everyday lives."

"Our memories and how they can be changed by simple suggestions that you didn't even pick up on. A memory was always a fact to me, like playing back a recording. Now I understand how wrong I was. This was even more important to know and use in my profession as a police officer."

"Over the duration of this course, I've come to realize that a lot of the issues with our society are simply because we are bombarded with information that exists at our fingertips and that is pushed at us from numerous sources, all too willing to confirm our beliefs rather than impart facts. If people knew how to be properly skeptical and how to do real research into the credibility of sources and how to find factual information, this would be a much different world."

"Everything in this course was outstanding! I already hold a BS in Space Studies from another university and thought I had a good handle on the scientific process. This class really showed how little I knew about the scientific process and how to critically think while being skeptical of the evidence provided. Would highly recommend this course be mandatory for all majors in the university."

cine and autism "controversy," homeopathy, astrology, and climate change denial. Many students believe in various forms of pseudoscience, and its inclusion increases engagement and teaches them how to recognize pseudoscience in their daily lives. Importantly, these issues help students understand why it's important to think critically, because being fooled can lead to real harm.

Finally, many activities are based on inoculation theory, which is similar to how vaccines work but for misinformation. Basically, exposure to a bit of misinformation can help build up immunity to the real thing. In some activities, students use humor to create misinformation, such as an advertisement for a pseudoscientific, alternative medicine product and a discussion in which they use fallacies to argue why they shouldn't fail the course.

The Bottom Line: Skills Over Content

Undergraduates who aren't STEM majors may take only one or two science classes, which are often the last chance we have to teach students the science literacy and critical thinking skills necessary to be informed citizens. It is possible to teach these skills, but they can't just be a component of the curriculum; they have to *be* the curriculum.

Science literacy is about more than memorizing facts. Instead of teaching students *what* to think, a good science education teaches them *how* to think. By emphasizing process over content, students gain the skills necessary to think better and therefore make better decisions. The ability to think critically has never been more important. We owe it to our students (and society) to teach them curiosity, skepticism, and humility.

The premise of this course is intellectual empowerment. I tell students at the end of every class, "Thinking is power. So demand evidence and think critically!" ■

Acknowledgement

Special thanks to Matthew P. Rowe for his feedback and guidance.

References

Harrison, Guy. 2021. How to repair the American mind: Solving America's cognitive crisis. Skeptical Inquirer 45(3): 31–34. Available online at https://skepticalinquirer.org/2021/04/how-to-repair-the-american-mind-solving-americas-cognitive-crisis/.

Lett, James. 1990. A field guide to critical thinking. Skeptical Inquirer 14(2): 153–160.

Rowe M.P., B.M. Gillespie, K.R. Harris, et al. 2015. Redesigning a general education science course to promote critical thinking. *CBE Life Sciences Education* 14: 1–11. Available online at https://www.lifescied.org/doi/pdf/10.1187/cbe.15-02-0032.

Melanie Trecek-King is an associate professor of biology at Massasoit Community College. Her website is www.ThinkingIsPower.com.

SCIENCE AND THE PUBLIC

Earn your master's degree in Science and the Public through the University at Buffalo!

Explore the methods and outlook of science as they intersect with public culture and public policy. This degree is ideal for enhancing careers in science education, public policy, and science journalism—and prepares you for positions that involve communicating about science.

This unique two-year graduate degree program is entirely online. Take courses from wherever you are in the world at your own pace! Courses include: Science, Technology, and Human Values; Research Ethics; Critical Thinking; Scientific Writing; Informal Science Education; Science Curricula; and History and Philosophy of Science.

UB Science and the Public

Co-Developed by UB Graduate School of Education and the Center for Inquiry

cfi CENTER FOR INQUIRY

For details visit: https://ed.buffalo.edu/teaching/academics/masters/science-public.html

Honing Your BS Detector: Conspiracy Theories and the SLAP Test

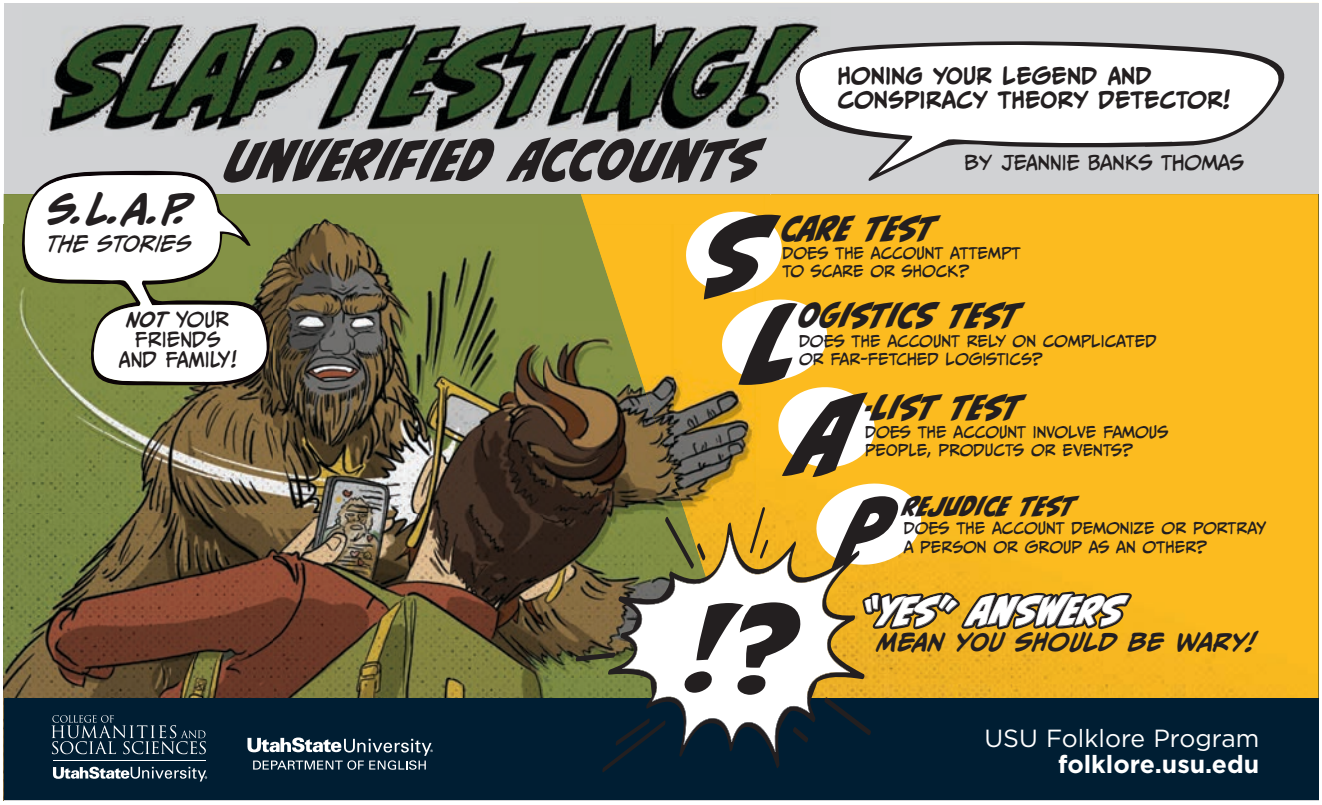
After reviewing fifty years of legend, rumor, and conspiracy theory research, a folklorist proposes a simple test to help someone quickly assess how much they should trust a story.

JEANNIE BANKS THOMAS

In early March 2020, when the United States was just recognizing the seriousness of the COVID-19 pandemic, I got a text from my college-aged son late one night. At its core was a rumor that America was about to undergo martial law, thus allowing military decisions to take the place of existing laws. My son told me that he heard it from a friend he's known since kindergarten. My son's friend said the alert came to him from his dad, who is a firefighter and first responder. The first part of the text I got indicated that the National Guard, the U.S. military, and all first responders were going to be deployed to help enforce the quarantine. After reading only a few lines, I immediately forwarded it to my sister.

My sister actually read the entire text. Then she got online and did some simple and fast fact checking. Within minutes, she texted me a refutation of the martial law rumor. Immediately, I slapped my forehead with my palm: What had I been thinking—or *not* thinking—by forwarding that text without reading it entirely or checking it out? To make matters worse, I am a folklorist who has studied legends and rumors for decades. *I should have known better*. However, in the spirit of Skeptical Inquirer's Harriet Hall (2019), I knew that I could learn something worthwhile from my error. I decided to review the experience and "reassess my priors," to borrow an expression statisticians use to describe the logical process of reevaluating a prior assertion. This phrase has the added benefit of sounding a whole lot better than, "Yeah, I screwed up." Whether we call it "reassessing our priors" or "owning our screw-ups," interrogating them without mistake shaming can open a path to enlightenment. It did for me.

As I thought about why I responded to the martial law text with more credulity than was typical for me, I realized I had been in the perfect, textbook situation to be suckered by a rumor. First, when I got the text, I was under a great deal of stress because I was trying to figure out how to respond to the rapidly changing circumstances of the first global pandemic in my lifetime. Second, the


SLAP TESTING!
UNVERIFIED ACCOUNTS
HONING YOUR LEGEND AND CONSPIRACY THEORY DETECTOR!
BY JEANNIE BANKS THOMAS
S.L.A.P.
THE STORIES
NOT YOUR FRIENDS AND FAMILY!
S CARE TEST
DOES THE ACCOUNT ATTEMPT TO SCARE OR SHOCK?
L OGISTICS TEST
DOES THE ACCOUNT RELY ON COMPLICATED OR FAR-FETCHED LOGISTICS?
A -LIST TEST
DOES THE ACCOUNT INVOLVE FAMOUS PEOPLE, PRODUCTS OR EVENTS?
P REJUDICE TEST
DOES THE ACCOUNT DEMONIZE OR PORTRAY A PERSON OR GROUP AS AN OTHER?
!?
"YES" ANSWERS MEAN YOU SHOULD BE WARY!
COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
UtahStateUniversity.
UtahStateUniversity.
DEPARTMENT OF ENGLISH
USU Folklore Program
folklore.usu.edu

text came from a trusted family member, my son. Third, it was late at night, and I was tired. Finally, I was trying to assess risk and figure out what safety measures to take without nearly enough information. At that time, I didn't know exactly how much of a threat the disease posed or how it spread. Every aspect of my daily life had suddenly and dramatically changed. I was wrestling with questions, including, "Do I need to quarantine the mail? Should I swab down my groceries with Clorox wipes? How contagious is the virus? How sick will it make people?" Like all Americans, I was facing shortages of disinfectant wipes, toilet paper, flour, and yeast. I was beginning to wonder if I had to worry about the U.S. food supply chain getting disrupted. Also, when I got the text, I had just read the news that California counties in the Bay area were under "shelter in place" orders. So, I did what a lot of Americans do: I decided to "share the scare" with someone I loved, to borrow a phrase from Benjamin Radford (2021a).

I also realized that, to my credit, when I'm less sleep deprived and less worried about contagion, illness, and toilet paper, I'm typically quick to spot rumors and conspiracy theories—as are skeptics and my colleagues who study these types of narratives. So, an important question to ask was, "What was I doing *right* in all those other situations when I quickly realized I was dealing with a rumor or conspiracy theory?" My years as a folklore scholar meant that I was attuned to their patterns. For example, I could easily identify when old patterns were repeated, such as when anti-Semitic blood libel rumors and legends were recycled during the Satanic Panics of the 1980s and 1990s—and then again when those same narratives got dredged up with a little variation and incorporated into the contemporary QAnon conspiracy theories.

I realized that clearly articulating even a few of the patterns that frequently signaled a legend, rumor, or conspiracy theory could be useful for people who don't study these genres professionally. I wanted to help us all quickly identify an unverified account when we encounter it in our everyday lives. This is a desperately needed skill in the face of the pandemic proliferation of misinformation, rumor, and conspiracy theories. The process needs to be simple and easy to remember, so people can apply it in real time when they encounter these narratives.

The SLAP Test

To discern the patterns that signal an unverified account, I reviewed over fifty years of legend, rumor, and conspiracy theory research. I also did a pattern analysis of over 100 legends. What emerged from this process is what I call the SLAP Test. SLAP is an acronym for Scare or Shock, Logistics, A-List, and Prejudice. Using this simple test can help someone quickly assess how much they should trust a story's veracity. The acronym is intended to be sticky; people can't use a tool they can't remember. This test is something we can all use to SLAP some sense into ourselves when it comes to conspiracy theories and the choking algal bloom of questionable narratives fueled by the coronavirus pandemic.

The SLAP Test consists of four simple questions:

1. Does the account attempt to *scare* or *shock*? If the answer is yes, be wary.
2. Does the account rely on complicated or far-fetched *logistics*? If the answer is yes, be wary.
3. Does the account involve *A-listers*—famous people, products, or events? If the answer is yes, be wary.
4. Does the account demonstrate *prejudice*; that is, does it demonize or portray a person or group as "other"? If the answer is yes, be wary.

"Yes" answers should make our personal BS detectors go off like the loudest alarm on our cell phones. Once this happens, some quick online research can help us further assess the account. Here, it's important to keep in mind that what some person says on a message board does not constitute "research." Research, of course, is vetted information that is supported with evidence. Reliable fact-checking sites on the internet provide this kind of information; examples include Leadstories.com and FactCheck.org. The SLAP Test can help us process the fire hose of misinformation that is today's internet. It can give us the time we need to slow down and think before we obey the implied imperative (Believe this! Share this! Do something! Buy my supplements!) that conspiracy theories often push.

Research indicates that getting in arguments with friends and family about conspiracy theories doesn't work (Bodner et al. 2020). We will always have hardcore conspiracy theorists and true believers. No amount of SLAPping will get through to them. However, it can help the rest of us, such as a young woman I talked with at a beauty salon. She asked me what I did for a living, and I told her I was a folklorist who studied legends, rumors, and conspiracy theories. She said, "Oh, I love conspiracy theories!" She told me that she and her family liked to watch conspiracy-based shows on Netflix and then discuss them. I replied, "Conspiracy theories are really interesting, aren't they? Tell me about one that intrigues you." She then mentioned the conspiracy theories positing that George W. Bush was behind the September 11, 2001, attacks.

I listened and didn't say anything. When she was done, I asked her, "Would you like an easy tool that helps you decide which conspiracy theories are probably true and which ones are probably false?" She said yes. By this time, all the other salon customers in the room were also listening to our conversation. I quickly laid out the SLAP Test and asked her what happened when she applied it to her favorite conspiracy theories. I could see she was thinking and SLAPping the stories. Soon she started laughing and said, "Well, I should be wary of them all!" Then, to my delight, she went on to provide more analysis of her own of the stories. "You know," she said, "What I always wonder is why do people believe just one person who shares these conspiracies?"

The young woman in the beauty salon deserves a lot of credit for being open-minded and willing to analyze the conspiracy theories that she liked. When she told me she enjoyed conspiracy theories, I was careful not to shame her for that. I also didn't talk too much; I listened. When I did converse with her, I tried to avoid conveying sentiments such as, "Beware! Conspiracy theories are evil! Why on earth would you believe that junk?!" Again, such an approach is usually not persuasive (Radford 2021b). Instead, I hoped to communicate to her that she could still enjoy the conspiracy theories while quickly assessing their likely veracity—a process that also encourages further engagement with the narratives and can even add to their fun and intrigue. The SLAP Test didn't take away or stigmatize a source of narrative pleasure for her and her family. Instead, it gave her a tool to do more thinking about stories she already relished.

The SLAP Test didn't take away or stigmatize a source of narrative pleasure for her and her family. Instead, it gave her a tool to do more thinking about stories she already relished.

Scholars and skeptics are sometimes criticized for coming across as grumpy, pleasure-killing scolds. The SLAP Test allows for a more exploratory, even playful, frame. It also provides a way for people to uncover truth for themselves. Instead of getting into pointless arguments about rumors and conspiracy theories, using the test is a way that we can all SLAP unverified stories—and not our friends and family members. ■

References

Bodner, John, Wendy Welch, Ian Brodie, et al. 2020. *Covid-19 Conspiracy Theories: QAnon, 5G, the New World Order and Other Viral Ideas*. Jefferson, NC: McFarland & Company.

Hall, Harriet. 2019. I was wrong (and I bet you were too). Skeptical Inquirer Online (July 9). Available online at https://skepticalinquirer.org/exclusive/i-was-wrong-and-i-bet-you-were-too/.

Radford, Benjamin. 2021a. *Squaring the Strange, Episode 144* (March 19). Podcast audio. Available online at https://squaringthestrange.libsyn.com/episode-144-prof-jeannie-banks-thomas-and-the-slap-test.

———. 2021b. Roots of and responses to COVID-19 vaccination hesitancy. Center for Inquiry blog (April 2). Available online at https://centerforinquiry.org/blog/roots-of-and-responses-to-covid-19-vaccination-hesitancy/.

Jeannie Banks Thomas is a folklorist and professor at Utah State University (USU). She is also a fellow of the American Folklore Society. She is the author or coauthor of numerous articles and several books about legend and gender. She codirects USU's Digital Folklore Project, which names the #DigitalTrendoftheYear.

Creating a Monster: The Case of Eachy

Could a false article on Wikipedia generate reports of an actual monster? After one ecologist undertook such an experiment, the fictional monster "Eachy" appeared in books, on clothing, and in tourism literature. Thus, a new local lake monster tradition was born.

CHARLES G.M. PAXTON

In 1971, the magazine *Man, Myth and Magic* reported sightings of the ghost of an eighteenth-century vicar on the docks of Wapping in east London (Smyth [anonymously] 1971). The article quoted several witnesses to a sinister vicar whose ghostliness was revealed by his tendency to suddenly disappear. Historically, there had been a local vicar who ran a boarding house where the unfortunate tenants were murdered.

Except there wasn't. In fact, the vicar of Ratcliff Wharf was a hoax generated by Frank Smyth as an experiment, as he revealed in the London's *Sunday Times*[1] several years later (which was also broadcast by the BBC in a program called *A Leap in the Dark* on February 18, 1977). But by then, the hoax had apparently become local folklore and generated *actual* reports of a ghost in Wapping.

Intrigued by Smyth's experiment, I wanted to give it a twenty-first-century cryptozoological twist. Could I generate cryptid reports by simply saying a specific location was associated with a monster? Ideally, such an experiment should be undertaken at locations that had no monster tradition, so any resulting monster reports could be directly linked to my actions. I therefore intended to create an entry on a monster in Wikipedia for two localities where there was no evidence of any sort of monster history (or at least where I thought there was no monster history): Bassenthwaite and Windermere, two freshwater lakes in the English Lake District. Both lakes had had regular extensive biological sampling of plankton, fish, etc., for decades undertaken by the Freshwater Biological Association and the UK's Centre for Ecology and Hydrology (e.g., Paxton and Winfield 2000), so the chances of an actual giant unknown species genuinely being present were negligible. I wanted to make the monster distinctive so it would not be a generic sea serpent–type monster that could be generated by boat wakes, etc., but instead a monstrous aquatic humanoid. So on July 9, 2006, I placed an anonymous request to create a page on Wikipedia for a monster from "northern Britain" known as an Eachy, a play on *Each-Nisge*, the Scots Gaelic name of the kelpie or water horse. I pronounce it, incorrectly, as if it had had an actual Gaelic origin, "Eekee." After initial prevarication by one Wikipedia checker, the article was posted on July 12 as below, including typos:

> An **Eachy** is a name given to a species of lake monsters from a variety of locations in northern England and Scotland. An Eachy was typically a large humanoid being of gruesome and slimy appearence seen to occasionally emerge from the lake. An Eachy was reported from Windermere in 1873 and Bassenthwaite Lake as late as 1903.
>
> Sources
>
> • Gould, M.J. (1980) 'Folklore of Northern Britain.' Nix. Kendal.

The original Wikipedia editor had accepted an anonymous article, although he/she noted that there was no other mention of such a thing on the internet. However, the presence of the bibliographic reference convinced him/her to proceed with the creation. After that, the addition of the false etymology created an aura of scholarship about the article (to be fair, procedures for creating and adding to Wikipedia articles have tightened since then; see "Skepticism One Wikipage at a Time: Talking with Wikiskeptic Susan Gerbic-Forsyth" in the March/April 2012 Skeptical Inquirer). The Gould book was entirely fictitious. There were minor edits (tags, etc.) to this, but then on July 28, I added a false etymology:

> *Presumably the name comes from the middle English "iker" which was a type of sea monster or perhaps Each-uisge, the water horse although the latter was not anthropoidal.*
>
> ***Sources***
>
> • *Gould, M.J. (1980) 'Folklore of Northern Britain.' Nix. Kendal.*
>
> • *Lewis, R.E. (1954) Middle English Dictionary. University of Michigan Press.*

The account of the Eachy was quickly reproduced on Wikipedia mirror sites. It did not spread from there, although it spread within Wikipedia. Then someone reported an actual aquatic monster from Windermere. In February, a professional photographer, Linden Adams, reported and photographed a strange wake. In fact, he contacted me about it, and an article appeared in the local press (Duncan 2007). But the Eachy, being a gruesome humanoid, was completely different from the monster being reported. As far as I could tell, Adams was sincere and completely unaware of the fake "tradition" of the Eachy. Indeed, he then coined the term *Bownessie* for the wake monster (a pun on Bowness, a village by the side of the lake, and Nessie, the Loch Ness monster). It was all a most unfortunate coincidence. On March 26, 2007, I added a link and mention of the Eachy to the Bownessie Wikipedia page, which someone had created but, alas, no longer exists. Reports of Bownessie have continued somewhat infrequently to this day (e.g., Proctor 2011).

Meanwhile, the Eachy got into print. The book *Further Cryptozoology* by Ronan Coghlan was published in May 2007, containing a catalogue of cryptozoological entities, including the Eachy, where it was described as a "humanoid of English legend." This

was the first of several printed accounts.

Some strange edits to the Wikipedia page then happened. In August 2007, for some unstated reason, the date of the most recent Eachy encounter in Bassenthwaite was changed from 1903 to 1973. There may have been a justification for this (see below). In response to my foolishly announcing my little experiment in August at a cryptozoological conference, a kind and helpful spoilsport added the following comment "At the Weird Weekend in Devon (2007) it was averred that the article above has no basis in genuine folklore." Fortunately, this helpful and true comment was removed by another editor with no connection to me soon thereafter. I never mentioned the Eachy again at a conference.

Meanwhile, the account of the Eachy was added to the Bassenthwaite Wikipedia page on August 27, 2007. This was something of a catalyst. Within two months, the information on the Eachy had spread to some Bassenthwaite and Windermere tourism sites, e.g., Lakelubbers.com ("Bassenthwaite Lake" 2007).

As of January 17, 2008, I discovered that Eachy monster t-shirts were being sold on the internet (Figure 1).

On February 10, 2008, I discovered a website, now deleted, which helpfully classified monsters and mythical beings into categories. Eachy made it into the "Giant" (≥ 3.00 m/9'10") humanoid section, and hence for the first time, internet denizens explicitly gave the Eachy a size.

Having lived in Cumbria—and never having heard of a monster (except for some biggish pike) in Windermere or Bassenthwaite prior to my creation of the Eachy—it did not occur to me that anyone would actually find any historical monster stories. However, an edit to the Wikipedia page on March 16, 2008, using a website titled "Folklore of Bassenthwaite" (Langstone 2008), added more to the story: photographs were taken of the Eachy in 1973! The author of the website, a self described "esoteric explorer," says of the 1973 sighting that two photographs were taken, and he named the witness. I asked him about this, and he told me he got it from another website but could not remember the details. I was doubtful as to the existence of the other website and thought the seemingly factual information was made up.

On September 14, 2009, a Wikipedia editor named Sigurd Dragon Slayer added a new dictionary reference for the etymology, which did not in fact mention any of the relevant words. A little later, the Eachy would be listed under the Northumberland folklore disambiguation page. When an editor asked why this was listed as Northumberland folklore, the same Sigurd Dragon Slayer gave the following surprisingly confident reply (on March 10, 2010), "Because it isn't only Cumbrian but also Lothian and occasionally found on the English east coast (parts of Durham mainly). Though it is more commonly Cumbrian it must be said."

Scientists Search for "Monster"

LONDON, Sept. 11.

Four atomic scientists wearing rubber suits, flippers, and snorkel breathing tubes yesterday led an underwater hunt for a "lake monster."

Reports had described the "monster" as 13 feet long with three humps and a head like a python. It had been "sighted" in Bassenthwaite Lake in North-west England.

During their one hour and a half search, the group found an eel, half a dozen golf balls and a fishing rod. — A.A.P.-Reuters.

Figure 2. The hunt for a monster from Bassenthwaite, *The Age* September 12, 1961, page 4.

To my chagrin, more historical information turned up in 2010. On January 10, 2010, a new edit to the Wikipedia page occurred. Someone had dug up a newspaper report from September 1961 from a newspaper called *The Age* that says that three "atomic scientists" did an underwater exploration for a monster in Bassenthwaite. This was a real newspaper article (Figure 2). I have found no other reference to this event in any other newspaper, so the article was presumably a hoax made for reasons unknown.

Then it turned out that the "esoteric explorer" was vindicated. I had found his source (Jacobsen 2008, originally), and there was indeed a report of a monster sighting on Bassenthwaite in 1973. Tourists Gunnar Jacobsen and Rudolf Staveness saw something on Bassenthwaite in 1973. However, their photos look a lot like birds. There is also something slightly suspicious about their dates. One of their photos appears to show a Loch Ness Investigation Bureau van, but the Bureau had finished its operations on Loch Ness in 1972 (Williams 2016), although Loch Ness monster researcher Adrian Shine told me it is possible some vans were still around at that time.

I started paying less attention to the Eachy then, but people were and are producing Eachy artwork and even occasionally mentioning it on Twitter (where I naturally helpfully retweet). All was then well until August 6, 2019, when Wikipedia editor Rich Flambrough decided to investigate the background of the Eachy. He correctly noted one of the references could not be found and the other did not actually mention the Eachy. He listed the article for deletion. According to Wikipedia rules, it would be debated for a week and then if necessary be deleted. However, this would mean it would be only the second longest exposed hoax on Wikipedia (at thirteen years and one month). Two more months, and the Eachy could claim the title—at least temporarily—of being the longest hoax on Wikipedia. The Eachy had to be saved. An appeal to my Fortean and skeptical colleagues then resulted in some edits to the page. In my first intervention in the article for several years, I argued that it should be kept, because I managed to find an article that bizarrely mentioned in passing Victorian

Figure 1. Eachy T-shirts. The left-hand t-shirt is closer to how I imagined the Eachy. The right-hand t-shirt was based on a cartoon style rendition of the chupacabra, the goat-sucker monster reported from various locations in Latin America (Radford 2011).

accounts of the monster (Robinson 2017). However, the majority of editors who participated in the debate were for deleting the article, and the Wikipedia page for the Eachy was then unceremoniously deleted.

Conclusions

The Eachy experiment shows that truth can be stranger than intended fiction. I assumed there were not any historical monster reports from Bassenthwaite, and yet some reports did emerge. Who would have guessed someone would report a monster on Windermere independent of my experiment? I really do not think the Bownessie sightings were due to me, as none of the Bownessie sightings reflected the specifically humanoid aspects I attributed to the Eachy. Maybe a more plausible monster would have generated sightings, but then I would not have recognized Adams's report as independent of my experiment. The local newspaper *The Westmoreland Gazette* has mentioned Bownessie several times but has never mentioned the Eachy.

My experiment failed in that I did not manage to generate eyewitness testimony of the Eachy from Bassenthwaite or Windermere sightings; to that extent Smyth's results were not replicated. Nevertheless, I did create a monster yarn that continues online and in print to this day, demonstrating how little solid evidence is really required to create a "tradition" of a mythical creature.

Monster localities clearly can have distinct unrelated traditions. Bownessie was, as far as I can tell, entirely independent of the Eachy. My Eachy of Bassenthwaite was independent of the Norwegians' sighting of 1973 and the sighting by the "atomic scientists" in 1961. The Jacobsen and Staveglass sighting (if not a hoax) became part of the historical rationale of the Eachy even though there is no actual connection between the phenomena. Likewise, at Loch Ness, the 1,500-year-old Adomnan's *Life of Columba* (Adomnan 1995) account of an aquatic beast discovery is cited as the first ever Loch Ness monster report, ignoring the multitude of monsters encountered by legendary Irish saints and the huge gap in time between Columba and the first modern sighting in 1930.

More interestingly, I think the tale of the Eachy tells us the dangers of how Wikipedia can be subject to manipulation. The Eachy escaped from Wikipedia into the wider world despite no factual basis whatsoever. Some editors were adding spurious information to the page, not for my honest reason of deceit but seemingly out of an inflated sense of their own erudition! More insidiously, of course, if an Eachy article were created in the near future, a naive (or knowing) contributor to Wikipedia could write it by citing the now wholly "independent" sources created by the original article—just as I tried to do in the deletion debate on the page on August 8, 2019. This problem has been recognized by some journalists (Harrison 2019), and it was even illustrated in the web comic xkcd.com (see Monroe n.d.), which termed it citogenesis. It is clearly a major problem. Such a tactic surely must be being undertaken by other far more sinister agents on Wikipedia than I am. Want to change history or besmirch someone's reputation without evidence? Create nonsense on Wikipedia, wait until someone uses it, and then use that usage to justify the article on Wikipedia with the whole insidious circular process lost to history—though, as noted, the rules have become more stringent since my experiment.

Of course, I could argue by virtue of this article, the Eachy is now notable enough to justify its own entry, but I will leave that to the reader to decide. I suspect the Eachy has now escaped from Wikipedia, and it cannot return to its fictional depths. The Eachy now exists in various cryptid lists online, tourism sites, artwork, books, and on online clothing stores. If you buy an Eachy t-shirt, no commission comes to me. The Eachy is now the property of the world. ■

Acknowledgements

My thanks to those who tried to preserve the Eachy in its last dying days.

Note

1. Unfortunately, because of COVID-19, I have been unable to locate the actual *Sunday Times* article that revealed the hoax, and I am relying on secondary sources.

References

Adomnan. 1995. *Life of Columba*. Translated by R. Sharpe. London, UK: Penguin.

Bassenthwaite Lake, England, United Kingdom. 2007. Landlubbers.com. Available online at https://www.lakelubbers.com/bassenthwaite-lake-1611/.

Duncan, Peter. 2007. Huge creature spotted in lake. *The Westmoreland Gazette* (February 23). Available online at https://www.thewestmorlandgazette.co.uk/news/1213765.huge-creature-spotted-in-lake/.

Harrison, Steven. 2019. The internet's dizzying citogenesis problem. *Slate* (March 7). Available online at https://slate.com/technology/2019/03/wikipedia-citogenesis-circular-reporting-problem.html.

Jacobsen, Gunnar. 2008. Loch Ness and the Bassenthwaite Eachy. Hogaland. Available online at http://www.hogaland.no/lochness-bassenthwaite.html.

Langstone, Alex. 2008. Folklore of Bassenthwaite. *Spirit of Albion Blog* (March 31). Available onlline at https://spiritofalbionblog.blogspot.com/2008/03/legends-of-bassenthwaite_16.html.

Monroe, Randall. N.d. Where citations come from. Available online at https://xkcd.com/978/.

Paxton, Charles G.M., and Ian J. Winfield. 2000. Some statistical aspects of the long-term gill net monitoring programme for pike *Esox lucius* in Windermere (English Lake District). *Freshwater Forum* 14: 35–50.

Proctor, Kate. 2011. Bownessie' spotted again by holidaymakers. *The Westmorland Gazette* (February 24). Available online at https://www.thewestmorlandgazette.co.uk/news/8873590.bownessie-spotted-again-by-holidaymakers/.

Radford, Benjamin. 2011. *Tracking the Chupacabra: The Vampire Beast in Fact, Fiction and Folklore*. Albuquerque, NM: University of New Mexico Press.

Robinson, Richard. 2017. Beast resurfaces. The Lake District Wildlife Park (October 4). Available online at https://www.lakedistrictwildlifepark.co.uk/news/beast-resurfaces/.

Smyth, Frank (anonymously). 1971. The phantom vicar of Ratcliff Wharf. *Man, Myth and Magic* 105: 2957–2958.

Williams, Gareth. 2016. *A Monstrous Commotion: The Mysteries of Loch Ness*. London, UK: Orion.

Charles G.M.Paxton is a statistical ecologist at the Centre for Research into Ecological and Environmental Modelling, University of St. Andrew, Scotland, with an interest in the history and science behind reports of aquatic monsters (www.sea-monster.info). He tweets @charlespaxton4.

For a number of years, I've been teaching a graduate seminar at the University of California, Irvine, titled Memory and the Law. The course has a strong focus on the repressed memory controversy. In the 1990s, thousands of individuals claimed to have recovered repressed memories of extensive brutalization, often after suggestive psychotherapy. Sometimes they claimed they were forced to participate in horrific satanic ritual abuse. Rarely was there an iota of corroboration. Graduate students must write a final paper, and one paper submitted by Emma Rodgers was so unusual, so impressive, that I thought it needed to have a wider readership than just one single professor who would be providing her with a grade for the course. I asked Rodgers whether she would be interested in submitting the paper to the Skeptical Inquirer, *and she was thrilled with the idea. It turns out she had long been a devotee of the magazine—an interest she shared with her father. And so that is how it came to be that a relatively new graduate student would come to be writing for this splendid magazine.*

—Elizabeth F. Loftus, Distinguished Professor, University of California, Irvine

Searching for Satan in 2021: An Update on Satanic Ritual Abuse Claims

An active network of therapists, scientists, and community figures are making questionable claims about repressed memories and satanic ritual abuse that sound eerily similar to those from thirty years ago.

EMMA LOUISE RODGERS ROMERO

Outside of baseball, cheap beer, and Botox, paranoia is America's favorite pastime. From Salem to Pizzagate, the American psyche has so routinely blazed with paranoia that conspiracy has become accepted as a part of our jangled quilt. Yet few moments in U.S. history can eclipse the turbulent events of the late 1980s and early 1990s now known as the Satanic Panic. Marked by a rash of court cases alleging widespread satanic ritual abuse, including sexual abuse and human sacrifice, what made the Satanic Panic so shocking was an almost complete lack of concrete evidence. As fringe as it may sound today, it was a fear that gripped mainstream American consciousness for the better part of a decade.

The Satanic Panic was fueled in part by the widely accepted belief that memories of horrific ritual abuse could be

first repressed and then recovered. With increasing frequency, adults with no previous memory of abuse claimed to suddenly recover memories of being physically and sexually assaulted by satanic cultists as children. More disturbing, these recoveries were frequently made after entering psychotherapy for seemingly unrelated problems. Therapists and patients went on daytime talk shows to broadcast their stories to the masses (Hughes 2017). Their diagnosis was grim: not only was Satan real, but thousands of his cronies were silently operating in your community, slaughtering babies and sexually assaulting children. What's worse, free of the burden of memory, absolutely anyone could be a victim. Part pop psychology, part legal drama, all marked with supernatural flair, it is easy to see why this was a particularly effective paranoia.

The ripples of this time still lap on modern shores. Within the past year, multiple major news sources have published articles calling for a reappraisal of the Satanic Panic, including the *New York Times* (Yuhas 2021). Chiefly these pieces highlight the connections between the Panic and recent QAnon theories of ritualistic sacrifice. However, a closer look under the rock reveals an active network of therapists, scientists, and community figures making claims that sound eerily similar to those from thirty years ago. In early 2021, I set out to survey the aftermath of the Satanic Panic, discovering that news of Satan and friends didn't disappear—it just went online.

Mind Control Is the New Black

An initial wellness check revealed an updated field. First, I noticed that many, though not all, believers have elected to shed the "satanic" from satanic ritual abuse in what appears to be an attempt to distance themselves from the Satanic Panic and increase their credibility.[1] There are a few exceptions, including r/SatanicRitualAbuse on Reddit—a jumbled collection of exorcism videos, Satanic anecdotes, and cryptic comments that lean very heavily into the classic satanic ritual abuse angles. However, a general survey reveals that even those who don't label it as such still very much subscribe to the satanic aspects of the ritual abuse. It seems this shift is perhaps more of a public relations strategy than a fundamental difference.

The concept of repressed memory seems to have also evolved. Perhaps due to push back from the scientific community surrounding repressed memory (Patihis et al. 2014), a new phenomenon has taken the center stage: mind control. Somewhat bizarrely, it appears mind control is a modern-day explanation for the lack of memory many self-described satanic ritual abuse victims experience. Mind control, it is posited, is achieved through a systemic method of mental reprogramming, ranging in severity from physical torture to strangers on public transit engaging in "subtle hand signaling" (e.g., excessive nose scratching) (Brick 2003; Brick 2017). In an almost direct repeat of Satanic Panic era–therapeutic practices, modern-day therapists who specialize in ritual abuse cases claim that such mind control results in dissociative identity disorder—formerly known as multiple personality disorder, a diagnosis that was used during the Satanic Panic to add legitimacy to claims of repressed memory. Though history may not repeat, it sure is rhyming.

Few websites provide a more thorough representation of modern satanic ritual abuse claims than S.M.A.R.T. (Stop Mind Control and Ritual Abuse Today—they almost had it with that acronym), a highly active resource for all things ritual abuse, mind control, and cult activity. S.M.A.R.T. is an organization founded in 1995 by Neil Brick, who identifies as a survivor of ritual abuse and mind control tactics. The organization operates on the platform of "disseminating information on the connections between secretive organizations, ritual abuse, and mind control by providing resources to survivors of child abuse, ritual abuse, and mind control."

S.M.A.R.T. publishes monthly newsletters that are available on its website, covering recent news and criminal cases that are claimed to provide hard evidence of widespread, global satanic ritual abuse. In reality, S.M.A.R.T. seems to cherry-pick articles that relate to sexual abuse broadly and tout them as irrefutable evidence of underground sex abuse rings. S.M.A.R.T. reported extensively on the Bill Cosby case and sexual abuse propagated by members of the Catholic Church. None of these events, while possibly true and terrible, has been in any way linked to satanism by outside legal or journalistic entities.

S.M.A.R.T. seems to cherry-pick articles that relate to sexual abuse broadly and tout them as irrefutable evidence of underground sex abuse rings.

Another half or so of the S.M.A.R.T. newsletter is devoted to smearing opponents. Nearly every newsletter has an entry dedicated specifically to the Satanic Temple and its current leader, Lucien Greaves. They have called him, at various times, a potential anti-Semite and a friend of pedophiles (S.M.A.R.T. n.d.), then hidden behind disclaimers such as, "All accusations are alleged. … The ideas I discuss here today are only my own or where cited taken from sources." Similarly, they routinely bash the False Memory Syndrome Foundation (FMSF) as a massive occult disinformation project. FMSF is a long-standing support group for families and individuals impacted by false memory accusations. The organization has no history of openly attacking S.M.A.R.T.

Then, once a year, the circus comes to town. S.M.A.R.T. hosts an annual conference open to the public, featuring presentations ranging from the benign ("Nature and the Nature of Healing: How the Natural World Restores Us to Our Senses—Inside and Out"), to the cryptic ("Deception by Organized Abuser Groups: Helping Your Front People and Your Insiders Recognize the Lies and Tricks Which Keep You Enslaved"), to the ironic ("How to Avoid Being Mind Controlled at a Conference"). Open to the public, of course, means something different in S.M.A.R.T. lingo. Members of

the press and people openly skeptical of ritual abuse are prohibited from entry.

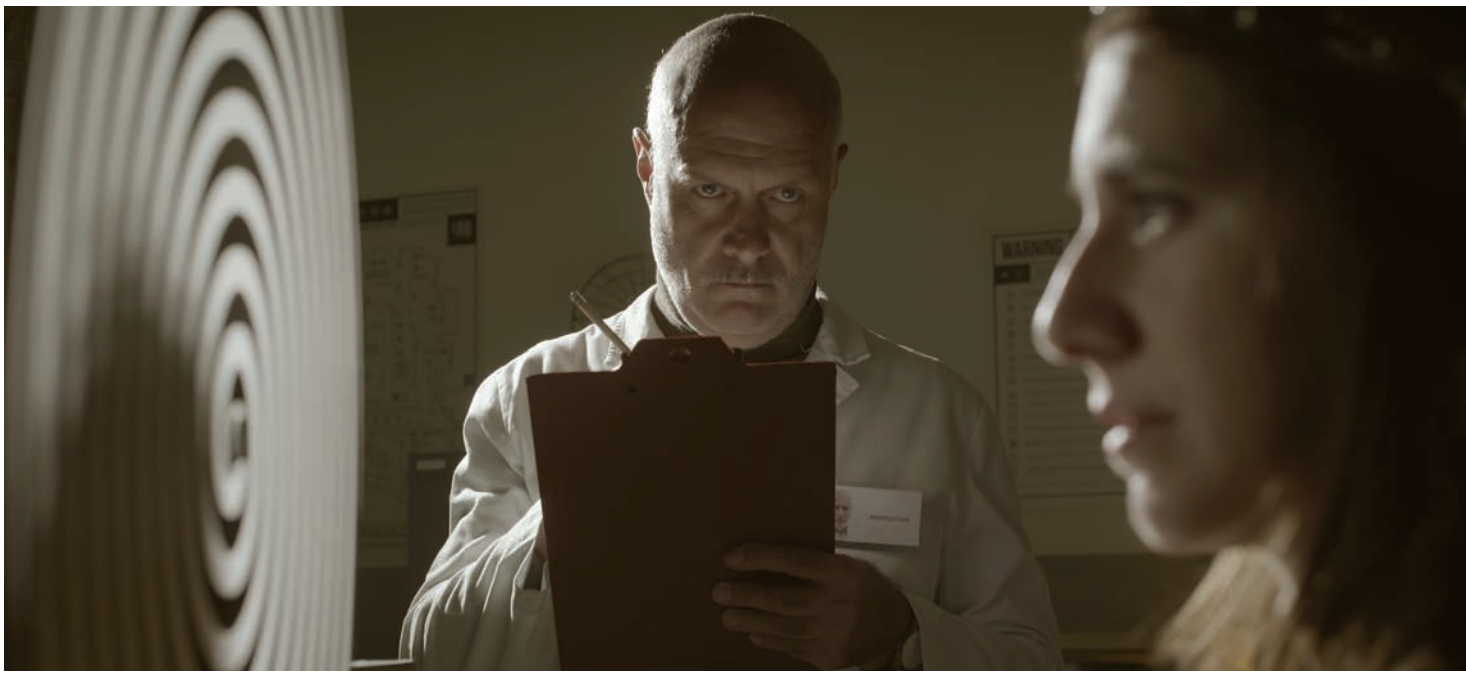
Frequent contributors to the S.M.A.R.T. conference and website include Randy Noblitt, a professor at Alliant University in Los Angeles; Alison Miller; and Miller's patient and coauthor Wendy Hoffman. Each of these individuals firmly believes that underground cults are sexually abusing children and engaging in personality-splitting, brain washing techniques to make them unaware of the abuse. And none of them wanted to talk to me.

Determined to hear it from the horse's mouth, I emailed mental health practitioners, researchers, religious leaders, and folks working in unrelated fields who had shared their experiences online. Almost none responded. It wasn't until after I received my first reply that it occurred to me that I was going about it all the wrong way. Until this point, I had been reaching out to folks through my university-sponsored email address. I would cite myself as a doctoral student in the Psychological Science program at University of California, Irvine, explain that I was searching for current cases of satanic ritual abuse, and ask if a professional source could pretty please hop on Zoom and help me understand what is going on with these Satanic cults. After sending a decidedly annoying number of emails to a few of the head figures in the community (notably, Noblitt and Neil Brick), one of my solicitations finally yielded a response.

Ellen Lacter is a San Diego–based therapist and author whose publications include *Guidelines to Diagnosis of Ritual Abuse/Mind Control Traumatic Stress* (2008) and *Torture-Based Mind Control: Psychological Mechanisms and Psychotherapeutic Approaches to Overcoming Mind Control* (2011). Her personal website, endritualabuse.org, offers resources for victims of ritual abuse and the practitioners who aim to help them. I reached out to Lacter with a standard inquiry, and, to my surprise, I received a response within a few minutes. Lacter dryly informed me that she doesn't stay current on court cases involving ritual abuse. She then shared with me a few pro-repressed memory resources from her website that I had already explored, including articles from the Recovered Memory Project.

Then the email got interesting. Lacter closed her correspondence with a short paragraph: "Before I would agree to do a Zoom meeting, I need to know if you endorse the work of Elizabeth Loftus. If you do, I cannot meet with you because I would be concerned that I would be misrepresented." Elizabeth Loftus is a faculty member at my university and an expert in memory who has long spoken out against the lack of scientific integrity in cases of repressed memory. I had not mentioned to Lacter that I was a student in Loftus's class, nor had I brought into question the validity of the claims that she and her collaborators were making. I went back and reread my original inquiry to be sure I hadn't done so much as imply disbelief. Then, I drafted a thorough, three-paragraph message stating that I am *not* a student in Loftus's lab, or a collaborator in any way, but am enrolled in a quarter-long course she is teaching. I followed this up by stating I've been trying to contact other S.M.A.R.T. figures, hoping that by showing I'd done my homework she would be willing to talk to me.

My three paragraphs were quickly answered with three sentences. "I need more clarity on your position on Loftus's work." She cut to the chase: "I also need to know your position on the existence of ritual abuse as a form of abuse. If you consider Loftus to operate with integrity or if you believe that ritual abuse may not exist, I cannot help you." I was shocked. I immediately began writing another email saying I wasn't aiming to discredit her but wanted more information before I believe in claims of mass ritual abuse. Then, I stopped. Just by being a student at the same institution as a known skeptic,



I posed too great a threat to engage in a Zoom meeting with Lacter. There was nothing I could say short of lying about my healthy skepticism and disparaging my professor that would yield a discussion. I never sent another email from my university address, and I have not responded to Lacter.

Perhaps this is for the best, however. In 2009, Neil Brick went to war against an undercover "journalist" who attended a S.M.A.R.T. conference (Mesner 2009; Brick 2009). This journalist, operating under the pseudonym Douglas Mesner, wrote an article about his experiences at the conference. Brick attacks Mesner first on a personal basis, for paying for the conference in a canceled check. Then, he tears down the statements Mesner made regarding the weak scientific evidence behind repressed memories, citing links to the "proof" listed on the S.M.A.R.T. website. In a more comical turn, Brick also defends the anti-electromagnetic mind control metal hat display that was at the conference that year, essentially stating that it was poor form to poke fun at the literal tin-foil hat stand.

Somehow, things got even weirder. While looking for the fabled article, I discovered that Douglas Mesner's other alias is Lucien Greaves—the current leader of the Satanic Temple and a neuroscience Harvard graduate who specializes in false memory syndrome. The same Lucien Greaves who S.M.A.R.T. makes a point of attacking in nearly every newsletter. It remains unclear whether Greaves attended the conference. The only evidence he was there comes from S.M.A.R.T. itself, which would be highly motivated to report a card-carrying Satanist infiltrated its ranks for a weekend. Perhaps it is best to keep these folks at an arm's length. But all this makes me wonder: Would the Satanists respond to my emails?

The Perennial American Witch Hunt

In every post, article, webpage, and interview I found, fear was the reigning emotion. Ellen Lacter, Randy Noblitt, and Neil Brick were all actively promoting fear of global ritual abuse rings and mind control. Moreover, I felt all these folks had an intense fear of *me.* For them, I was a proxy for skepticism. And the fear of skepticism was so potent that it was almost impossible for me, a first-year graduate student with no history of … well … *anything* related to their field, to secure more than an email in return. The irony that this all-or-nothing, us-vs.-them mentality so closely resembles recognized cult behavior seems to be entirely lost on them.

At first glance, it may seem a waste of time to care about these claims considering bigger antiscience issues at hand. Indeed, many of these people operate from a place of wanting to help, not harm. But the truth remains that, as goofy as these concepts may appear, they can have real-world repercussions. Other than the terminally jangled psychology student, I'm certain that most people perusing the S.M.A.R.T. website are in pain. People suffering from depression, anxiety, or a mood disorder can easily wind up searching for relief on YouTube, where videos such as one titled "Are You Repressing Memories of Sexual Abuse?" (which currently has over 100k views) tout terrifying and unscientific claims that their symptoms are side effects of repressed memories. Hoping for answers, they could wind up at a website such as S.M.A.R.T., where they find acceptance and an explanation for their struggles in believing they are victims of ritual abuse. In some ways, the greatest fear that all these people hold is the fear that, sometimes, our pain doesn't have to come from anywhere at all.

As far as my fear goes? I'm fairly confident that I'm on a S.M.A.R.T. do-not-admit list somewhere, but apart from that, I remain blissfully unfazed by my mad dash through the 2021 world of satanic ritual abuse. If anything, I am comforted to know that Satan hasn't gone anywhere. We could all use some good music. ■

Note

1. The website https://strengthtoheal.org/understanding-ritual-abuse/ is a clear example in which the term *ritual abuse* is used and described as "anti-God" without using the terms *Satan* or *satanic* at all. Is this a PR move?

References

Brick, Neil. 2003. How cues and programming work in mind control and propaganda. Survivorship East Coast Conference Presentation (May 24). Available online at https://ritualabuse.us/mindcontrol/how-cues-and-programming-work-in-mind-control-and-propaganda/.

———. 2009. Rebuttal to the report from the SMART 2009 conference. Available online at https://ritualabuse.us/ritualabuse/rebuttal-to-the-report-from-the-smart-2009-conference/.

———. 2017. How to Avoid Being Mind Controlled at a Conference and Freedom from Mind Control. Survivorship Ritual Abuse and Mind Control 2017 Conference Presentations. Available online at https://ritualabuse.us/ritualabuse/how-to-avoid-being-mind-controlled-at-a-conference-and-freedom-from-mind-control/.

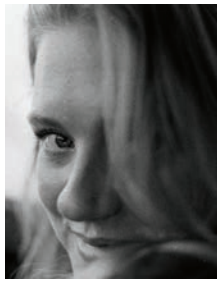
Hughes, Sarah. 2017. American monsters: Tabloid media and the Satanic Panic, 1970–2000. *Journal of American Studies* 51(3): 691–719. Available online at https://www.cambridge.org/core/journals/journal-of-american-studies/article/abs/american-monsters-tabloid-media-and-the-satanic-panic-19702000/D674 D558FA7399E91149BFCAB138792D.

Mesner, Doug. 2009. Report from the S.M.A.R.T. Ritual Abuse/Mind-Control Conference 2009, part 1. *The Process Is …* (August 25). Available online at http://www.process.org/discept/2009/08/25/report-from-the-s-m-a-r-t-ritual-abusemind-control-conference-2009/.

Patihis, Lawrence, Lavina Y. Ho, Ian W. Tingen, et al. 2014. Are the "Memory Wars" over? A scientist-practitioner gap in beliefs about repressed memory. *Psychological Science* 25(2): 519–530. Available online at https://journals.sagepub.com/doi/10.1177/0956797613510718.

S.M.A.R.T. N.d. Grey faction, Satanic Temple and Lucien Greaves fact sheet. Ritual Abuse Pages. Available online at https://ritualabuse.us/ritualabuse/grey-faction-satanic-temple-and-lucien-greaves-fact-sheet/.

Yuhas, Alan. 2021. It's time to revisit the Satanic Panic. *The New York Times* (March 31). Available online at https://www.nytimes.com/2021/03/31/us/satanic-panic.html.



Emma Louise Rodgers Romero is a PhD graduate student in Psychological Science at the University of California, Irvine.

Is SETI a Failure of Skepticism?

What is the value of the Search for Extraterrestrial Intelligence (SETI) program? One skeptic answers that question while setting the record straight on what we know—and don't know—about the existence of life outside of Earth.

LEONARD TRAMIEL

I realize that the title of this article is a bit confrontational. To be very clear, I'm going to be explicit in a few things that I might be able to take for granted: First, when I use the term *skepticism*, it refers to the positions taken by Martin Gardner, Ray Hyman, and James Randi when they formed Sanity in Research (SIR), which was later formalized as the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), now the Committee for Skeptical Inquiry (CSI). Second, there are people who are prone to reaching conclusions that aren't supported by the available facts. We often reach conclusions because we like them, even if the facts don't support those conclusions. We are led astray by cognitive biases and illusions and other flaws that are built into the ways we think. Skepticism tells us that the use of science and reason is vital to overcome these tendencies. This was simplified and popularized by Carl Sagan in the well-known phrase "extraordinary claims require extraordinary evidence." This has been distilled to its core in the phrase "I Doubt It" from CSI.

I think it is useful for any group to check how well it is doing in reaching its goals. I see one of the goals of modern, or scientific, skepticism as the evaluation of as many claims as possible to see if they are supported by the evidence. We've been doing this in a wide variety of areas, and a few of them have been quite successful recently. The recent interest and publicity around UFOs (or unidentified aerial phenomena [UAP], as they are now being called) has seen the skeptical view presented quite prominently, for example by several articles and online appearances by Mick West. We can also include the domain of alternative medicine. The current pandemic has focused much needed attention on the fact that bogus medical advice exists, and skeptics have been adept at showing some of the techniques that can determine whether a treatment should be trusted. If more people had embraced the skeptics' view of reality, I think the death toll of these past months would have been much lower.

One of the things I've come to realize after being involved with skepticism for quite a while now is that all of us are susceptible to these flaws. Even in skeptics meetings, I have encountered people who seem to think that this doesn't happen to them. They're wrong. By being aware of the problems

built into our cognition, we can reduce the mistakes we make or correct them quickly—but only sometimes. All of us fail in some areas and accept ideas that are not supported by the available evidence.

Think about the following assertions: viruses are a source of human disease; homeopathic principles lead to effective medical treatments; quantum mechanics allows cats to be dead and alive at the same time; with one trillion planets in our galaxy, it is certain that life is present on other planets because the chemical elements that form the building blocks of life are ubiquitous in the universe.

I'm pretty sure that most people would say that three of these assertions are scientifically sound—or they would as long as they hadn't seen the title of this article. You skeptics might be surprised, however, that only the first one is true. I'm confident that all of you knew the second is false. The third is a topic I'm doing some writing on at the moment.

The last one, however, is a pretty widespread belief. In fact, the conclusion that life is found throughout our galaxy was quite popular even before we knew that there were a trillion planets in our galaxy. Not only is it common in our culture in general, it is also common among skeptics. I've asked a lot of people at skeptical conferences (remember those?), and most would express the belief that life was common throughout the galaxy. It is also a widely held belief among prominent figures in skepticism. For example, Brian Dunning has said, "It's practically a mathematical and statistical certainty that life exists elsewhere." Bob Novella frequently says similar things.

The first part about the components of life being ubiquitous is true. We know from spectroscopic observations that the elemental composition of other stars and, by reasonable extrapolation, other planetary systems is very much like our own. Even more telling, we have the observations of amino acids in many dust clouds in our galaxy. This eliminates many of the arguments that could be made to show that life on Earth is unique or at least unusual. But it is important to realize that it doesn't support the assertion that life is "a mathematical and statistical certainty."

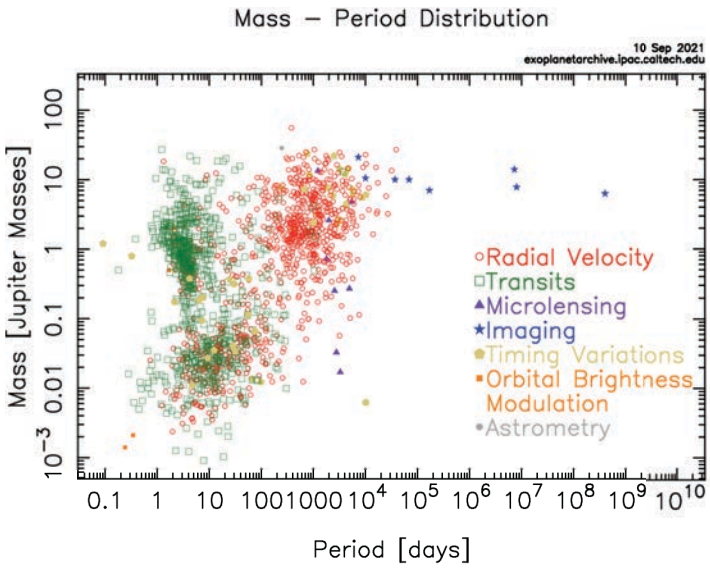
A very useful framework to look at these questions was developed by Frank Drake with his Drake Equation:

$$N = R f_p n_e f_l f_i f_c L$$

The first factor, the rate of star formation, is well known and not relevant to this discussion.

The next two, the fraction of stars with planets and the number of planets that could support life per star, are far better known now thanks to recent advancements, primarily the Kepler Space Telescope and the HARPS spectrograph. This is the reason we can confidently say that there are a trillion planets in our galaxy.

The Kepler Space Telescope has gotten a lot of coverage, and I suspect most of you are familiar with it and the transit method it relies on. This is not true of HARPS. The acronym stands for "high accuracy radial velocity planet searcher." It is located in the La Silla Observatory operated by the European



All the known exoplanets discovered through September 10, 2021, plotted by their mass and orbital period, with colors indicating their method of discovery.

Southern Observatory (ESO) in the Atacama Desert in Chile and mounted on a 3.6-meter telescope. It detects planets, as indicated by the acronym, by measuring the radial velocity of a star as it moves around the center of mass of the star-planet system. This method is responsible for the second largest number of confirmed planets as shown in the above graph.

The transit method data points are in green; the radial velocity ones are in red. It is interesting to note that this method is far more sensitive to planets with longer period orbits, so it finds planets that the transit method isn't that sensitive to.

This is how the first planets around regular stars were found. The first such exoplanet to be discovered imparted a velocity of 53 m/s, or about 120 miles/hour, to its star, 51 Pegasi. HARPS can detect radial velocities of less than 1 m/s. This would allow it to see the radial velocity imparted on our sun by Jupiter, Saturn, and Uranus. A couple of the more significant results from HARPS include finding that about 40 percent of red dwarfs have planets in the habitable zone and discovering a planet around the closest star to our sun.[1]

The next factor, f_l, is the last one relevant at this point. It is the fraction of planets that could support life that in fact develop life. It is basically the fraction of planets upon which abiogenesis occurs.

Abiogenesis—the natural process by which life has arisen from nonliving matter—is an active research area. Although there have been many proposals made to describe the process, or components of it, we still don't have detailed knowledge of how it happened on Earth or even how it *might* have happened. The fact that life began on Earth in a geologically short time is often cited as evidence for estimating f_l as near 1. If we use the Copernican Principle, otherwise known as the Principle of Mediocrity, we are led toward the idea that f_l is near 1. If it happened here, it could happen other places. However, estimates based on the probability of self-replicating nucleic acid chains randomly forming give results near 0.

Our ignorance of the value of f_l is essentially complete. We just don't know. I think there is only one appropriate reaction. No matter what the other factors are that go into our estimates, if the best we have for one of them is "I don't know," then the product is also "I don't know." (I'd like to credit my friend Jay Diamond for introducing me to the mathematics of "I don't know" in a talk of a similar nature.) I don't see any other conclusion that can be supported by what we know. So saying either f_l is high or low isn't well supported by actual knowledge. I see asserting any conclusion about f_l as a failure of skepticism.

If life happened quickly on Earth and there are many planets out there, it seems quite reasonable to think that it exists on some of those planets. There is good evidence that life doesn't need to be rare. But to conclude that life is common ignores what I think is the only scientifically justifiable answer: "We don't know." To put this in the context of Carl Sagan's maxim, I think that part of the reason that this failure occurs is that the claim of extraterrestrial life doesn't seem like an extraordinary one. We have good reason to think that life may be common, and when we combine this with the familiarity all of us have with living beings, we are lulled into a conclusion. We are swayed more by the availability heuristic than solid reasoning.

So what does this say about SETI, the Search for Extraterrestrial Intelligence program? The rest of the factors in the Drake equation don't matter at this point; "I don't know" is still the answer. In the interest of full disclosure, I'm a big fan of SETI, and I serve on one the SETI Institute's advisory boards.

This might make some of you wonder why I would work with the SETI Institute given the highly speculative impression I have of SETI. There are a couple of reasons for this. First, I'm not opposed to highly speculative efforts. The question "Are we alone?" is an old one. It has captured the attention of both experts and lay people for millennia. If SETI succeeds, just imagine what we could learn. At this point, one of the most profound questions the program might be able to answer is "How did you not destroy yourselves?" We might also be able to learn new scientific ideas, possibly in areas we don't even know we are missing. We will also learn what it means to exist from another, probably very different point of view.

On the other hand, if after a search far more extensive than we have done to date SETI doesn't succeed, we will know that we are very rare, if not unique. We will confirm that we are precious. As Jill Tarter said in her TED talk, when she was given the TED prize, "We live on a fragile island of life." If that island isn't one of many, we need to protect it.

First, let's see what some other SETI folk say about it. Seth Shostak, senior astronomer at the SETI Institute, has often repeated that he will bet that we'll find intelligent life within twenty years. That sounds like a pretty bold statement … at least until you see that the bet is for a cup of coffee. In Jill Tarter's TED talk, she also said, "SETI doesn't presume the existence of extraterrestrial intelligence; it merely notes

As Jill Tarter said in her TED talk, "We live on a fragile island of life." If that island isn't one of many, we need to protect it.

the possibility, if not the probability in this vast universe, which seems fairly uniform." On several other occasions, she has said, "If intelligent life isn't common in our galaxy, given the large number of planets, it is a terrible waste of space," echoing the words of Ellie Arroway, the protagonist of Carl Sagan's novel *Cosmos*, who is widely regarded as being, at least partly, based on Tarter. It strengthens the plea of Carl Sagan regarding the Pale Blue Dot: "This image of our tiny world … underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known."

But there is more to it than that. As SETI searches utilize new techniques, the knowledge gained adds to humanity's store and helps all of science. For example, with current technology we can produce very short, very narrow bandwidth optical signals that exceed the brightness of the Sun during the pulse. We can also detect these with the fairly new field called optical SETI. When we build new ways to view the universe, we find things that weren't expected. Who knows what will be discovered as a result of these new detectors?

The SETI Institute is currently deploying a set of detectors called LaserSETI that are looking for the brightest and longest of these signals. Will it find a new class of astronomical object? I look forward to finding out.

Because SETI, and in particular the SETI Institute, is a science-based endeavor, the questions it investigates haven't been limited to "Are we alone?" The mission of the Institute is to "explore, understand, explain the origin and nature of life." This is very close to the usual definition of astrobiology, which is generally defined as the study of the origin, evolution, distribution, and future of life in the universe. Most scientists and activities of the SETI Institute are part of the Carl Sagan Center for Research.

SETI's activities span a huge range. Some of it has an obvious SETI connection. For example, much of the data analysis for the Kepler and the Transiting Exoplanet Survey Satellite (TESS) planet-finding missions was, and continues to be, done by SETI scientists. SETI scientists also work on the Gemini Planet Imager. There is also work being done on a wide range of solar system planetary science. SETI scientists were involved in site selection for the most recent NASA Martian rover missions and have been producing papers on a wide range of topics about Mars and other planets.

There is also work done on smaller bodies in the solar system. Quite recently, there was announcement of the 3D modeling of the asteroid Kleopatra; the lead author is a SETI scientist. This analysis is a *really* deep rabbit hole; not only does this asteroid look like a dog bone, but it also has a couple of moons. The process of combining all the available data,

some of it obtained by the now-destroyed Arecibo radio telescope, was, let's say, complex.

Another area is work done by CAMS (Camera for Allsky Meteor Surveillance). This system uses multiple sets of video cameras to determine the orbits of meteors. This work is based on previous data taken with a set of 35 mm cameras. I'm particularly interested in this because I helped operate one such 35 mm camera system. That involved staying up all night during a meteor shower, cranking the film advance, and pressing the shutters on several cameras at regular intervals. It was a particularly frustrating thing for me to do because it meant I couldn't star gaze or meteor count. The sky conditions were great that night, and it felt wrong not to take advantage of the opportunity.

The search is an attempt to answer a profound question. And no matter what the answer turns out to be, it is well worth knowing.

This has led to new information about meteor showers and the bodies that cause them. The parent bodies of some showers have been identified by this work. This is putting real-world constraints on models of solar system formation. The same team has collected samples of meteorite falls from around the world. Asteroid 2008 TC was the first case where a known object was observed in space and then had samples retrieved. By going to those locations, it was possible to use on-site data and photographs taken by residents to determine the orbit of objects, such as the one that caused the Chelyabinsk impact, which weren't previously known. Another class of small solar system bodies that most people don't think of that way is planetary rings and moons. The Ring-Moon Systems Node of NASA's Planetary Data System is managed at the SETI Institute. This group worked to ensure flight path safety for the New Horizons spacecraft and also the discovery of several moons in the solar system and ring systems of the outer planets.

My background is in physics, so that's the subject that most immediately comes to mind for me. But astrobiology has, as the name suggests, a large biology component. SETI scientists do field studies all around the world in extreme environments, such as high mountain lakes, geysers, and isolated sub-ice lakes in Antarctica, to collect and study the ways life has evolved to adapt to these conditions.

They are also involved in crewed space flight efforts in projects such as the Haughton Mars Project (HMP), part of a research facility located on the world's largest uninhabited island, Devon Island. This harsh climate mimics the environmental conditions on Mars and other planets. Devon Island's barren terrain, freezing temperatures, isolation, and remoteness offer scientists and personnel unique research opportunities. The arctic day and night cycle and restricted communications capabilities offer fitting analogs for the challenges of long-duration space flights. There is also work into animal language. This has, of course, a SETI connection because it provides a path for learning about some of the ways nonhumans communicate.

The Institute also has a large outreach effort, which is where most of my direct involvement has been. They have produced science curricular materials, have the Education and Public Outreach contracts for several NASA missions, work with many outside groups to increase understanding and appreciation of science, and have a lecture and talk series that goes back many years and continues to this day.

This has barely scratched the surface of the work done at the SETI Institute.

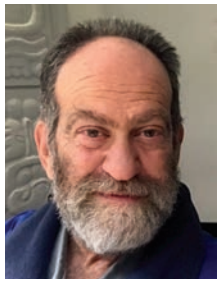
But I want to end by going back to the SETI search itself.

As I have hopefully made clear, the search has stimulated a lot of really solid science in a wide variety of areas, but it also provides a vision that ties it all together. The search is an attempt to answer a profound question. And no matter what the answer turns out to be, it is well worth knowing. We will either have discovered a source of information that may be superior to everything we have ever had, or we will have even more evidence of how precious our pale blue dot really is. It reminds me of a comment made to a U.S. Senate committee about what became the Fermi National Accelerator Laboratory by its first director, Robert R. Wilson: "It has nothing to do directly with defending our country, except to make it worth defending." SETI is that kind of activity. It inspires. It forces us to think about the universe and our, possibly very fragile, place in it. It brings out, in the scientific direction, the best in what it means to be human. When I was asked to make the case that SETI was worthwhile, the first thing I thought of was "Truth matters, and profound truths matter even more." ■

Note

1. As an interesting aside, I'll note a new instrument, the echelle spectrograph for rocky exoplanets and stable spectroscopic observations (ESPRESSO). ESPRESSO increases sensitivity to around 50 cm/s or less. This will allow us to detect even more planets and characterize the types of solar systems in our galaxy.

This article is based on an online talk to the New York City Skeptics.



Leonard Tramiel is a retired high-tech executive with a PhD in physics from Columbia University who works to promote the public understanding of science and skepticism. He is a member of both the Center for Inquiry Board of Directors and the Committee for Skeptical Inquiry Executive Council and is on an advisory board for the SETI Institute.

Creationist Funhouse, The Final Episode

No Rest for God

You would think, after all the work God did during the creation and the flood, he could retire and take it easy. But there is no rest for God! He is as busy now as he has ever been—in the weird world of creationist thinking.

STANLEY RICE

Many conservatives, including religious conservatives, believe there is no such thing as climate change, despite the fact that there is immense evidence that demonstrates it—evidence far beyond the scope of this article to summarize. They simply ignore the evidence and assume climate change must not be real.

Perhaps the most astonishing example of this rejection of evidence is by Oklahoma Senator Jim Inhofe. What is most interesting about him is the reason he rejects climate science. He actually said, during a press conference, that global warming *cannot* occur because God will not let it happen. He cites, as evidence, Genesis 8:24 in which, after the flood, God promises to never flood the earth again, and that the seasons such as summer and winter will never be interrupted as long as the earth exists.

You probably noticed right away that this verse does not say that the climate cannot or will not get warmer. Climate science does not claim that summer and winter will cease to exist; it just says that they will become warmer. Either Inhofe did not read the verse before citing it or he assumed that none of his followers would read it. And in that latter instance, he was probably right. Fundamentalists wave their Bibles in the air but rarely read them. (I have the survey data to prove it, but that is another story.)

But if Inhofe is right and climate change is not occurring, then why do all the scientific measurements indicate that it is? Thermometer readings from all over the globe indicate that it is happening. This can only mean one thing: God is monkeying with all the thermometers.

Not only that, but my research shows that the buds of deciduous trees in Oklahoma have been opening earlier in the spring over the past fifteen years in response to warmer spring temperatures. The data of other researchers shows the same pattern in places such as Illinois and Wisconsin as well as in Europe. Perhaps God has been dashing around North America and Europe making the buds open sooner to trick us into believing in climate change.

*

Creationists, like most other people, are perfectly happy to enjoy the fruits of medical research. They get drugs or surgery when they need them, and you don't see them seeking out exorcists to cast out demons when they are sick.

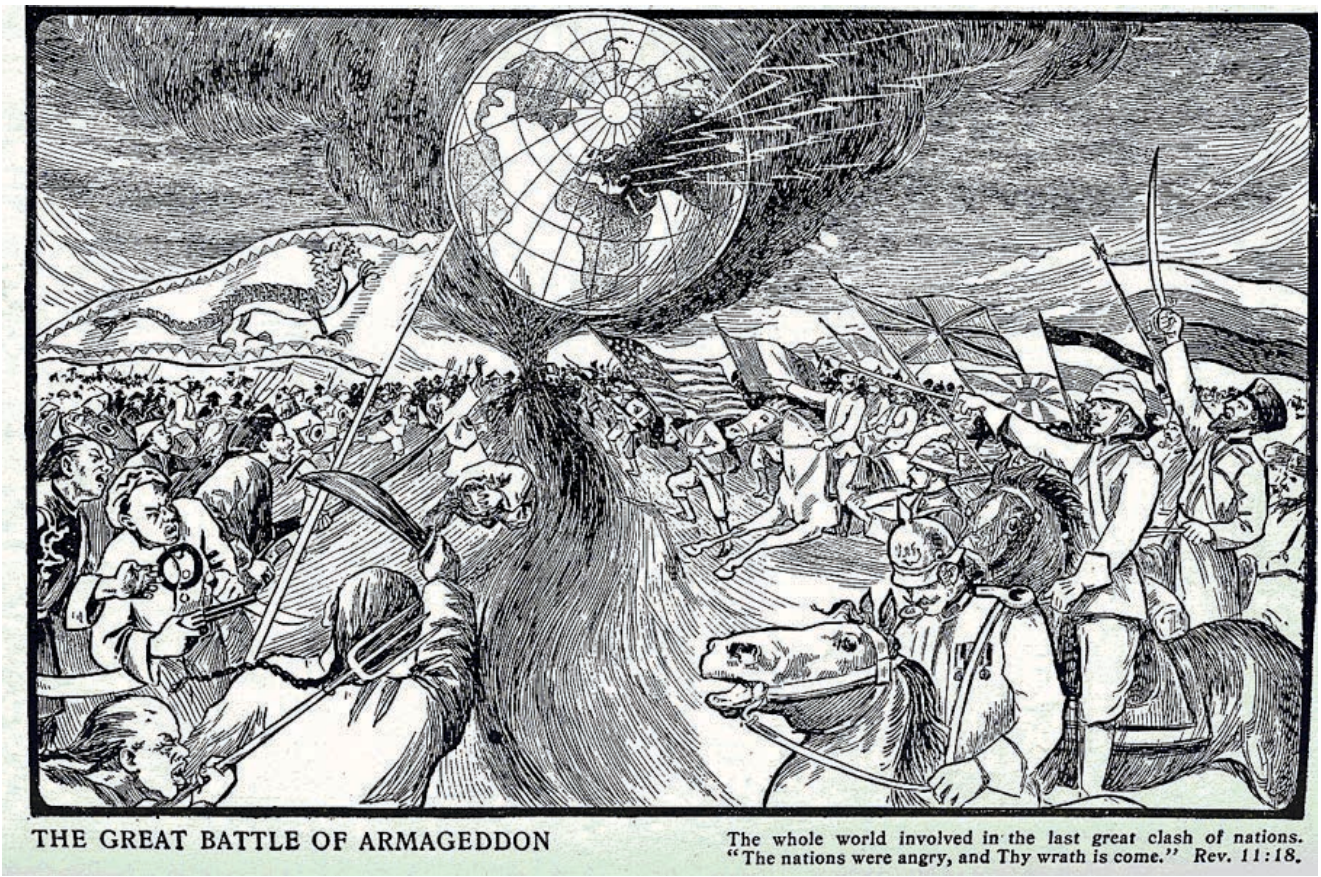
And yet, in the Gospels, fully one-third of the healing miracles that Jesus performs are described as exorcisms. I counted

Credit: Loraine Thompson

them myself, in two different ways. I listed the miracles in each of the four Gospels and figured out which ones were parallel accounts of the same event. But whether I did this or counted each miracle separately, I came up with the one-third figure.

Then why are there no medical exorcisms today? You would expect at least one-third of all serious illnesses to be due to demons and incurable in any way other than exorcism. Why don't creationists seek out exorcists when they are ill? Why don't they write their legislators and demand that medical schools teach exorcism the way they demand that schools teach creationism? Where is creationist medicine?

There are several possibilities. First, maybe demons have decided to go into hiding. The Bible, of course, does not say this. Second, maybe the term *demon* really refers to germs and mutations. But this is a nonliteral interpretation, especially because the Bible says many demons actually spoke. Third, many



THE GREAT BATTLE OF ARMAGEDDON

The whole world involved in the last great clash of nations. "The nations were angry, and Thy wrath is come." Rev. 11:18.

diseases may be caused by demons, but God goes around and makes them look like they are caused by viruses, bacteria, defective genes, or metabolic disorders—once again, not in the Bible.

*

One of the major breakthroughs in modern medicine was the discovery that many mental disorders are caused by problems with the brain. Some of these problems are due to injury, while others are due to genetic or developmental abnormalities. An understanding of brain-based behavioral problems has allowed the development of many interventions. Just one example is the surgical severing of the corpus callosum, between the two brain hemispheres, in extreme cases of epilepsy.

But these developments should make creationists quake in their sandals. The Bible repeatedly makes it clear that a person's behavior is due to their *soul*, not their brain. This is particularly true of epilepsy, the symptoms of which are described in Matthew 17 very clearly—and Jesus cured it by exorcism. The entire science of psychology stands as a threat to fundamentalist creationism. Genetic or developmental problems with brain activity make people do things that the Bible clearly indicates will get you sent to hell. There is no excuse. Just as Jean Valjean (in *Les Misérables*) could not blame poverty for his decision to steal bread, you cannot use a genetic inclination toward impulsiveness (which some people have) as an excuse for sinful behavior. The whole basis of damnation is thus undermined—not by evolution but by neurobiology. Without damnation, how else can fundamentalists threaten us for not believing what they say?

Why don't creationists write their legislators and demand that medical schools teach exorcism the way they demand that schools teach creationism?

Perhaps the most embarrassing example is that there appears to be a partial genetic basis for sexual orientation. But many conservatives insist that there is not, because if men are gay because of their genes, then this must be a bigger threat to the creationist version of Christianity than a whole ark full of Precambrian bunnies. Unless, that is, God slipped those genes into the cells of men who sinfully chose their behavior. I am not saying that genes force a person to behave a certain way; I am saying that the correlation between genes and behavior is significant and that behavior is not the result of a soul that is totally spiritual.

*

Biblical prophecies about "the end times" are notoriously difficult to interpret, mainly because most of them were *not* intended by the original authors as prophecies about the end of the world. Creationist fundamentalists love to cite Revelation as being the guidebook to the horrific and imminent future of earth. But most biblical scholars have concluded that it is a veiled and coded criticism of the Roman Empire. Christians,

undergoing persecution, wanted to encourage one another to persist in their faith but did not want to come out and say that Rome was evil. Rome tolerated religious diversity but not criticism.

This difficulty has not stopped fundamentalists from constructing all manner of outlines of the future that they claim to be as inerrant as the Bible itself. My two favorite examples are a privately published book titled *88 Reasons Jesus Will Return in 1988* and an Adventist book published in 1917 that claimed the world would end in 1917 in a gigantic battle with America, Britain, and Czarist Russia on one side and the Chinese on the other. Before 1917 was out, Russia was no longer Czarist. And after the Great War (as it is still called in France), tanks and artillery would replace horses as the main engines of battle.

No two self-styled prophets can agree on their predictions. They used to say that the Whore of Babylon described in Revelation was the Catholic Church. Now some of them think it is Hillary Clinton. After Clinton dies, as we all must, who will it be then? Michelle Obama?

And some of these fundamentalists have their guns and enthusiasm ready. While I was standing in line at a Wal-Mart in Oklahoma, a woman was buying a huge cart of frozen food for her freezer, which will run on a generator when the end of the world begins. Her husband had his AK-47s ready at home. She volunteered all this information to me, a stranger.

Every detail of this nightmare future would have to be miraculous. Take, for example, the passage in Revelation 14 that says that, in the final judgment, human blood would run as deep as the bridles of the horses (about two meters) for 1,600 stadia, which is 290 kilometers. No indication is given of the width of this river of blood, but if we assume it is ten meters wide, we are talking about 2.9 million cubic meters of blood. It would take 580 million freshly squeezed adult humans to render this much blood, all in a valley just outside of Jerusalem. One would be excused for thinking that even a fundamentalist would not take these numbers seriously. Certainly, the original author could not have meant it literally. But I heard a preacher make this very claim on a Christian radio station. She was gathering people to pay for a trip to go see this valley and imagine what it would look like filled five feet deep in blood.

God miraculously creating tons of blood! We ain't seen nothing yet!

*

Thus, at the end of this series, I appear to have left young-earth, global flood creationism down for the count on the mat. While this is true, it is not a very interesting outcome. Instead, the conclusion I wish to reach is that these creationists are taking the Bible—one of the most important products of human creativity—and forcing it into interpretations that the original authors could not have imagined. If a reader simply lets the Bible speak for itself, what does he or she find? The reader finds that the Bible is not a book but sixty-six books (or more, for Catholics) all written at different times and from different viewpoints. All the writers were struggling to make sense of the human condition, and they did so through facts, history, stories, poetry, and prophetic visions. "The Bible" doesn't say much of anything, and its books say contradictory things. There is nothing wrong with this. We need to let the Bible be the Bible and not force it, or force God—whatever god there may be—into certain molds upon which we insist.

"The Bible" doesn't say much of anything, and its books say contradictory things.

At least as important, humans should be free to investigate the mysteries of the world using whatever information is available—through science, philosophy, or art—rather than binding these mysteries into a little prison cell or blinding gullible religious people into not gaining knowledge. Give the pseudogenes a voice and let the red shift shine. ■

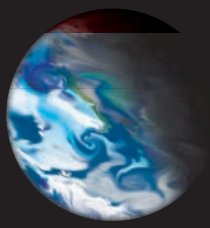
Creationist Funhouse Episodes in Skeptical Inquirer

1. "The Red Shift," May/June 2019
2. "The Curse," July/August 2019
3. "God Plays with Atoms," January/February 2020
4. "God Plays in the Mud," July/August 2020
5. "God's Pet Bunny," November/December 2020
6. "God the Biotechnologist," May/June 2021
7. "Lynn Margulis and the Great Convergence That Didn't Happen," July/August 2021
8. "No Rest for God," January/February 2022

Stanley Rice is professor of biological science at Southeastern State University and author of five popular science books, most recently *Scientifically Thinking*. He has been dealing constructively with creationism as a college science educator for three decades.

a legacy that stands

The Test of Time



Copyright © 2019 Crescendo Interactive, Inc. Used by permission. 19TH11

Even though astronauts last took steps on the moon in 1972, the imprint from each of their steps remains today. What a tremendous legacy! Those footprints will stand as a reminder of an accomplishment for generations to come.

What would you do if you had the power to do something remarkable today while making an impact that would last forever, the kind of impact that takes little time and costs you nothing? All of this is possible when you take a moment to review and update the beneficiary designations for your retirement and bank accounts.

If you have any of the following, then you have a great opportunity to leave your own lasting impact:

- IRA, 401(k), or 403(b) retirement accounts
- Investment accounts
- Checking, savings or CD account
- Life insurance you no longer need

The process of naming beneficiaries is easy. It gives you the power and control to tell your administrator who will inherit your accounts when you pass away. With a beneficiary designation, you still own the account and can continue to use it to meet your needs.

To name your beneficiaries, ask your account custodian, insurance agent, or bank to send you a beneficiary designation form, fill it out, and return it. You can name family, friends, or an organization like ours to inherit your account. When you leave a gift to us, we will be able to continue our work.

CONTACT US TODAY!

Connie Skingel
Director of Development
cskingel@centerforinquiry.org
(716) 300-8311
cfilegacy.org

John of God: The Many Crimes of a Spiritual Fraud

Benjamin Radford

John of God: The Crimes of a Spiritual Healer. A Netflix documentary series. 2021. Directed by Mauricio Dias and Tatiana Villela.

John of God: The Crimes of a Spiritual Healer is a Netflix true crime documentary series from Brazilian filmmakers Mauricio Dias and Tatiana Villela about the titular scoundrel (real name João Teixeira de Faria). Known for decades in South America, João de Deus (John of God) was a prolific medium who claimed to channel the spirits of dozens of doctors, biblical figures (e.g., King Solomon), and others. John of God is perhaps best known for performing psychic surgeries, claiming to treat and remove tumors and disease using only his hands (although in some cases, he also used scalpels or forceps) at his compound in the small Brazilian town of Abadiania.

Dispensing herbal medications and spiritual cleansings to his white-clad staff and followers, he claimed to have treated millions of people since the 1970s. Oprah Winfrey, never shy about promoting pseudoscience and bullshit, endorsed John of God both in her magazine (in 2010) and on her television show in a 2013 segment titled "Do You Believe in Miracles?" In true fleecing fashion, he and his followers sold crystals, herbs, amulets, "healing water," and other such typical New Age quasi-religious baubles.

The four-part series, in Portuguese with (occasionally awful) English dubbing, is told through archival footage, interviews, newspaper clippings, and some reenactments. The *crimes* the title refers to are accusations of sexual abuse (involving over 300 alleged victims), much of it done under the guise of healing touches, and some of it in full view of those in the room (although John of God often requested that those present bow their heads and close their eyes to help effect the prayer healings).

The series demonstrates how easy it is to manipulate desperate people and believers—especially in the context of not only spiritual but physical healings. Not everyone believes in the same type of spiritual salvation, but health problems are universal, and curing—or in this case *appearing* to cure—them can be a profoundly moving experience. Abuse performed under the guise of spiritual healing is nothing new; see, for example, "Psychic Medium Accused of Sexual Exploitation" in the September/October 2012 issue of Skeptical Inquirer. There are parallels to other abusive cults and religions such as those depicted in documentaries such as *Wild, Wild Country* and *Going Clear: Scientology and the Prison of Belief*.

The series effectively reveals the pressures that John of God brought to bear on the community, including his own daughter, who appears in the film. She accused him of assaulting her, then recanted (when he arranged for her children to be taken from her), and then later reaffirmed her original accusations. As much as John of God had a spiritual grip on his community, he had strong financial and political ones as well. Rural Brazil is largely impoverished, and when his fame spread, it attracted followers (many with money, coming from America and Europe). This led to a boom in hotels, restaurants, and other local businesses that came to depend on him. John of God became a mini-industry, and there was little incentive to question the local cash cow. A handful of women and men did, however, and eventually police were forced to act. In 2018, under mounting pressure and then seventy-eight, John of God turned himself in to authorities, claiming his innocence. He was sentenced in the following years to over sixty years in prison.

The stories recounted by survivors are appalling, but what's perhaps even more shocking about *John of God: The Crimes of a Spiritual Healer* is that the filmmakers buried the lede. Mauricio Dias and Tatiana Villela seem unaware of, or unwilling to expose, the fact that John of God is not a gifted spiritual healer who took advantage of female followers for decades. He is also a fraud; he has no healing powers whatsoever, and not only is there no scientific evidence he healed or cured anyone, but he caused harm when people sought out his services instead of seeking real medical help.

This is important, because the series ends with a few introspective comments by some followers who—however grudgingly—acknowledge that John of God may indeed be guilty of misconduct but are quick to add that he did, after all, heal and save thousands of people. This halfhearted attempt at finding a redemptive silver lining is both misguided and offensive. To be clear, this is not just the story of a sexual predator operating

under the guise of religion, a holy healer led astray by greed and lust. John of God is not a flawed conduit of miracles; he's a fraudulent conduit of malice through and through.

It's not clear why the filmmakers took this route. Either they were aware of the skeptics' accusations of fraud against John of God (quite apart from, and predating, the abuse accusations by decades) and unethically chose not to include them, or they were unaware of them and are merely guilty of sloppy research and/or biased presentation. I suspect the answer is that the filmmakers are either true believers in John of God's miracles or they recognized that many of the victims they interviewed are (which is clear from several of the comments)—and much of their audience likely is. This put them in an awkward ethical and editorial quandary; at least some would likely denounce the film for refuting miracles they sincerely believe occurred, even as they denounced John of God as a predator.

Because *John of God: The Crimes of a Spiritual Healer* couldn't be bothered to explain, much less debunk, John of God's methods and claims, I'll provide a short summary here. The fact that the "surgeries" were done without anesthetic or severe pain was considered miraculous but is entirely explicable. Contrary to the claims, many of his victim/patients *did* in fact report feeling some pain and discomfort—at least one patient interviewed on television described "excruciating pain"—but less than they had expected based in part on the amount of blood they saw. But this is simple anatomy; when a short incision is made with a razor or scalpel, the pain will be minimal, far less than with other types of injuries, such as lacerations. Furthermore, injuries to some parts of the body with many nerve endings (such as the scalp) bleed profusely but are relatively painless.

Then of course there are psychological explanations, such as the placebo effect (being told you won't feel pain can cause you to register little or no pain), and simply being in a heightened state from being in the presence of and "healed" by a famous healer is likely to draw your attention away from pain. There are also social influences; his patients, similar to faith healing recipients in church and on television, are well aware they're being watched and have incentive to play along—and endure any discomfort and pain—in the same way that participants in stage hypnosis shows follow the hypnotist's cues.

Claims are presented, without evidence, that the incisions and "surgeries" John of God performed at his rural compound didn't become infected, which might be remarkable—if it's true. As with most faith healing cases, there is little if any follow-up, and when there is, it's usually by skeptical investigators (who are conspicuously absent in this documentary). Faith healers are focused on the performance in the moment, the sensational healings in front of witnesses and cameras in which something seemingly inexplicable and miraculous happened. Medical doctors, on the other hand, are focused on the *outcome*: Did the treatment actually help the patient, cure the cancer, or remove the tumor or trauma? That is not a question that can be answered in the moment, or even in the hours or days afterward. Tracking whether people were truly healed (or even verifying post-operative infection rates) may take weeks or months of diligent follow-up, something John of God and other faith healers have no incentive to do. Ironically, it's mainstream doctors—not faith healers—who treat patients like people instead of publicity props.

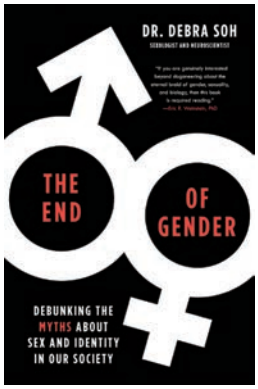
John of God also did a version of a sideshow stunt called the Blockhead act, in which objects such as tweezers were inserted seemingly at dangerously impossible depths into patients' skulls, sometimes removing bits of flesh he claimed was diseased. The techniques of psychic surgery are well documented in these pages and in books (such as *The Faith Healers* by James "the Amazing" Randi) and involve little more than some practiced sleight of hand skills, greatly aided by a fervent desire to believe. (Randi appeared on a 2005 episode of *ABC News Primetime* to discuss John of God and, as usual, was given less than a minute to refute the myriad claims.)

Overall, *John of God: The Crimes of a Spiritual Healer* is a mediocre and inadequate look at the life and crimes of João Teixeira de Faria. It offers some insight into how a serial predator could have succeeded for so long but dares not poke the elephant in the room. It's heartening that some measure of justice was finally brought to bear on this fraudulent faith healer, but John of God's victims—who number in the thousands, not hundreds—deserve better. ■

Benjamin Radford is deputy editor of the Skeptical Inquirer and author of several books such as *Scientific Paranormal Investigation*, *Big—If True*, and, forthcoming, *America the Fearful*.

Are New Gender Beliefs Based on Science and Research?

PETER HUSTON



The End of Gender: Debunking Myths about Sex and Identity in our Society. By Debra Soh. New York, NY: Threshold Editions, 2020. ISBN 9781982132514. 322 pp. Hardcover, $28.00; softcover, $16.99.

There's been some strange paradigm shifts among the educated classes of the Western world lately concerning gender. For one thing, in some circles, people are asked to state their gender and give their preferred pronouns. Controversies exist about bathroom assignment. Specialized therapists, speakers, and publications have emerged to encourage the wider public to develop greater sensitivity and new mores and etiquette for emerging genders.

This, of course, would normally be none of my business. To each his, her, their, aers, faers, airs, pers, vis, xyrs, or hirs—to include the new pronouns—own business. Still, important social and medical issues are involved, such as at what age it is appropriate for a child, or the child's parent, to declare the child transgender or seek physical treatments such as hormone injections or mastectomies.

Again, this would be an interesting and important subject, but it is likely outside the purview of this magazine.

What interests us here is how much of this is based on science and research, as well as how much of this is affecting scientific research in this area. Debra Soh's *The End of Gender: Debunking Myths about Sex and Identity in Our Society* is a readable book that attempts to answer these questions and provide a full discussion on current gender beliefs and science. She also looks at the controversies, pseudoscience, bad science, and social assertions being used in place of real science to guide important life-changing decisions and educational, medical, and legal policies.

Soh is a neuroscientist who specializes in human sexuality, gender, and paraphilias. A doctoral graduate of York University, she has been widely published in both popular and academic circles. Lately, as a quick visit to YouTube can confirm, she's often interviewed as a critic of several popular gender-related beliefs.

Her book is structured in an introduction, a conclusion, and nine middle chapters. Each chapter debunks one "myth" (her term) that is commonly believed about sex, gender, gender identity, gender fluidity, the handling of transgender issues, their social and medical implications, and related issues.

In order, the nine beliefs that she examines and debunks are 1) "biological sex is a spectrum," 2) "gender is a social construct," 3) "there are more than two genders," 4) "sexual orientation and gender identity are unrelated," 5) "children with gender dysphoria should transition," 6) "no difference exists between trans women and women who were born women," 7) "women should behave like men in sex and dating," 8) "gender neutral parenting works," and 9) "sexology and social justice make good bedfellows."

This is a lot to take on, and there is a lot of information in this book, some of which inspires further questions. For instance, according to Soh, up until relatively recently most transgender people were born biologically male but felt themselves to be female, yet now an increasing number are young women who are transitioning to males. Why the change? It's tough to say with absolute certainty, but social factors are certainly a major factor.

People are also being designated as "non-gender conforming" at earlier and earlier ages. Why? Again, Soh argues it's due to social factors and that if left unlabeled, most children who announce they want to be the opposite sex grow up to be either gay or lesbian and feel no need to physically transition.

Throughout her book, Soh discusses how research is discouraged, distorted, or suppressed, with some topics being considered offensive or insensitive. For instance, there is a condition called "autogynephilia." Normally seen in males, it involves people who become sexually aroused and at times even achieve orgasm while cross-dressing. Soh discusses whether it is linked with the desire among some men to become women. In that context, she says researchers of the topic are facing harassment.

Researchers looking into "desistence," or the remittance of feelings of gender dysphoria naturally over time, are also discouraged and even harassed. Although widely documented, the topic, according to Soh, does not fit the paradigm many activists promote. She writes that while brain studies indicate that some people are innately gay or les-

bian, the studies that discuss the brains of non-gender-conforming people are often either flawed in various ways or the evidence is overstated. She questions the paradigm believed in many circles that a person born male must declare themselves non-male to act feminine or that women cannot enjoy traditionally masculine activities while continuing to consider themselves women. She wonders if many celebrities who publicly announce a change in their pronouns might merely be seeking publicity. And, of course, she mentions detransitioners, the small but increasing number of young adults and others who began to physically transition but then decided to stop or reverse the process. Soh explains that while access to gender-altering hormone treatments on adolescents is increasingly common and considered a right by some, their long-term effects are still largely unknown.

Throughout the book, Soh names studies, cites her sources, and discusses the strengths and the flaws in these studies. She also, on multiple occasions, describes the backlash that has occurred when many of these studies were released and the attempts to suppress and silence the researchers who conducted them. When one is done reading this book, there will be little doubt that in our society today, issues surrounding sex, gender, and gender identity are often not being looked at and discussed scientifically. As a result, children and public policy are being adversely affected.

It's a powerful, important book. Because such beliefs tend to be embraced by intellectuals at the liberal/progressive/left end of the political and societal spectrums, they tend to be most criticized by people at the opposite, more conservative ends of the spectrums. Like many scientists who study human sexuality and related issues, Soh has always been more comfortable with progressive and liberal views of sexual diversity and supports LGBTQ rights. However, progressives and liberals are more likely to attack her work. She spends much time discussing how many sex researchers, once their research leads them away from being accepted by the progressive/liberal end of the political spectrum, soon find themselves being widely cited and reported on by publications and people they have traditionally seen as adversaries.

Remember how I said that Soh is a frequent interview subject on YouTube videos? A surprising number come from what would be seen as right-wing sources. Although Soh does not draw the comparison, I was reminded of how memory researchers were treated when they began studying and disproving notions of repressed and recoverable memories of hidden trauma. They found themselves shunned by former ideological allies. They were instead desired speakers by people and organizations they would once have avoided.

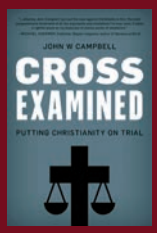
For this reason, Soh spends a great deal of time discussing how much she has enjoyed her contact and time among the LGBTQ community and her large number of gay friends. She also believes in people's right to sexual experimentation and accepts that some people are indeed transgender. She thinks there is value in many cases of gender-reassignment surgery. Alas, while important, in my opinion, she does this too often. It becomes distracting and annoying and may even seem condescending to some readers.

While not perfect, Debra Soh's *The End of Gender* is an informative, highly readable book that packs in a great deal of information on both science and the way scientific research and researchers are attacked when their results are not what some people wish to hear. Despite occasionally irksome passages, I recommend it highly. ■

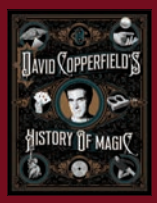
Peter Huston has been a contributor to this magazine since 1992. He is author of several books, including three on skepticism. His website is www.HamchuckWC.com.

NEW AND NOTABLE]

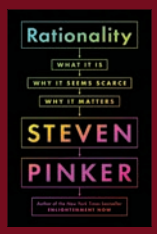
Listing does not preclude future review.



CROSS EXAMINED: Putting Christianity on Trial. John W. Campbell. An amazingly thorough, well-organized, systematic, methodical dissection of Christianity from the viewpoint of a trial lawyer. If Richard Dawkins leads with the scientific arguments against religion in *The God Delusion*, Campbell equally applies reason, rationality, legal principles, and arguments to dissecting the case of apologists for the Christian god. He considers the best arguments for Christianity and the best against it, making a full-throated argument for atheism in the mode of a trial lawyer making a case. Prometheus Books, 2021, 600 pp., $39.95.



DAVID COPPERFIELD'S HISTORY OF MAGIC. David Copperfield, Richard Wiseman, and David Britland. Photographs by Homer Liwag. Some have called him the greatest living illusionist. He has been described as the most commercially successful magician in history. Here David Copperfield, two coauthors (one our esteemed psychologist/magician colleague CSI Fellow Richard Wiseman), and a photographer present a nicely illustrated (100 photos from Copperfield's Museum of Magic), large-format history of magic, focusing on some of the grand figures of conjuring and their illusions, performances, and challenges to convention. A fitting companion to James Randi's 1992 large-format book *Conjuring* (St. Martin's Press). Simon & Schuster, 2021, 256 pp., $35.00.



RATIONALITY: What It Is, Why It Seems Scarce, Why It Matters. Steven Pinker. "Rationality ought to be the lodestar for everything we think and do," Pinker notes, but that's hardly the case. Yet Pinker, the optimistic cognitive scientist, can't accept the cynical view that our minds are a basket of delusions. We've accomplished a great deal. We are not comfortable with technocratic or bureaucratic impulses, but when we are given problems close to our lived reality and in the ways in which we naturally encounter the world, we can do quite well. Pinker champions rationality in this book, as he championed enlightenment values in his previous one, but he also seeks to learn and explain the enigmas that are making us do so many irrational things lately. He contrasts rationality within an individual and within a community as well as between two modes of believing: the reality mindset and the mythology mindset. After an introductory chapter on "How Rational an Animal?" he considers, in subsequent chapters, rationality and irrationality; logic and critical thinking; probability and randomness; beliefs and evidence; risks and reward; hits and false alarms; self and others; correlation and causation; What's wrong with people?; and Why rationality matters. Viking, 2021, 412 pp., $32.00.

SO-CALLED ALTERNATIVE MEDICINE (SCAM) FOR CANCER. Edzard Ernst. The prolific physician and medical researcher Ernst has already written a 2018 book titled *SCAM: So-Called Alternative Medicine*. Here he narrows that theme to focus specifically on SCAM treatments for cancer. His introductory chapter is itself a *tour de force* analysis. He begins with three basic facts: a high percentage of cancer patients use SCAM, misinformation about SCAM is rife, and misinformation endangers the lives of patients. He follows with a definition of SCAM and related terms, common (and misleading) assumptions about SCAM (e.g., that it is helpful, natural, and therefore safe), essential facts about cancer, a discussion of claimed "integrative" cancer care, ethical issues, and a lengthy discussion of what is reliable evidence. He then ends with a section on pseudoscience and pseudoscientists (including a list of twenty activities they use in SCAM). Subsequent chapters deal with plant-derived "natural" remedies, homeopathy, diets, acupuncture, massage, mind-body therapies, herbal remedies, supplements, and paranormal healing. A final chapter describes the risks of SCAM. It would be hard to find a better informed or clearer guide to the problems of using alternative medical treatments for cancer. Springer, 2021, 216 pp., $39.99 hardcover, $29.99 eBook.

—Kendrick Frazier

[LETTERS TO THE EDITOR

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON
UFOs (or UAPs) HIT THE NEWS
Keeping Your Brain Grounded
Credulous Media Coverage
The New Yorker Article
CSI Statement on UFOs
Academic Relativists and Science Denial
We Need More Historians and Social Scientists
Religious Prophecy and the 2020 Election

Examining Academic Relativists

As a professor of rhetoric, I read Sven Ove Hansson's article ("The Hidden Connection between Academic Relativists and Science Denial," September/October 2021) with great interest. I only wish he had highlighted more of the "excellent such research" that he intimated existed.

It is clear that rhetoric exists in many areas related to science, be it the funding received, the grants promoted, or even the manner in which scientific concepts are framed/promoted within science and when presented to the larger public. It is also clear that the rhetoric of science/inquiry engages science in a host of ways that his article either obscured or downplayed.

I also think Hansson missed at least two opportunities to bookend his discussion. The Alan Sokal hoax, as presented in the pages of *Social Text* and then announced in *Lingua Franca* (and then given further life in numerous articles and books), is the most obvious case. The more recent dustup involving former Portland State University professor Peter Boghossian and two colleagues is another. Both examples highlight the merits of Hansson's thesis. I make mention of both in my upper-division Ethics of Rhetoric class.

While Hansson may be guilty of being a bit selective in the evidence he chose from his "extensive study of social science literature since the 1960s," focusing primarily on the previous two decades, I still think that his overall point is well put. Perhaps he can follow this article up with one that extends a more

amicable hand to those in rhetoric and allied fields/disciplines who share his concerns.

Mark J. Porrovecchio,
Associate Professor of Rhetoric
Director of Forensics
Oregon State University-Corvallis, Oregon

UFOs Hit the News

Kudos to Andrew Fraknoi and Kendrick Frazier for their attempts to reproach *The New Yorker* for its recent dalliance with pseudoscience ("Two Letters *The New Yorker* Didn't Publish," September/October 2021). Allow me to share mine as well.

The adjective "astrology-blue," used by Rivka Galchen in "NASA's New Telescope Will Show Us the Infancy of the Universe" (*New Yorker*, August 16), is mysterious on its own. (How did *The New Yorker*'s vaunted fact-checkers ascertain that astrology is blue and not orange or green?) But applied, as it was, to the eyes of the astronomer Marcia Rieke, it also seems insulting. What's next? References to the "homeopathy-blond" hair of a physician or the "phrenology-dusky" complexion of a neuroscientist?

Glenn Branch
National Center for Science Education
Oakland, California

The latest sightings—in "How to Keep Your Mind on Solid Ground during the Latest UFO Excitement," September/October 2021, photo on page 34—caused quite a stir with a UFO (UAP) apparently streaking across the sky at high speed, making sudden and extraordinarily rapid turns as tracked from above by a U.S. Navy pilot. It reminds me of people who use a laser pen to tease a cat by projecting a light spot onto a floor or wall, which also can make sudden and rapid turns. With Israel announcing it has had great success in destroying drones with a powerful laser, I wonder if there is a satellite carrying such a laser and perhaps testing it by projecting a holographic image of a spacecraft whose movements appear similar to that when using a laser spot to tease a cat. Just asking.

Robert Berliner
Sherman Oaks, California

Robert Sheaffer starts with "Unless you have been hiding under a rock, you have no doubt noticed that news media have been filled with gushing, uncritical articles, proclaiming the glorious new reality of UFOs" ("UFOs Explode in Credulous Media," September/October 2021). Well, I haven't noticed such a thing, but I am not living under a rock. But I do not live in the United States. I live in Europe, and while UFO stories are not completely unknown here, it's safe to say that the USA is the world's leader in UFO conspiracies.

Now to be fair, Sheaffer's article was taken from his blog, which probably is mainly, if not exclusively, read by Americans. But the Skeptical Inquirer is an international magazine, and even with a strong focus on the United States, it would sometimes be helpful to remember that not all readers are intimate with American television programs or news articles or pop culture, etc., and at least offer a short recap for your international audience.

Peer Sylvester
Berlin, Germany

WHO's No-Drink Suggestion

Julia Lavarnway's Commentary, "WHO's Suggestion That Women of Childbearing Age Not Drink" (September/October 2021) lured me in with its interesting headline but left me wanting. It seems to have settled on a guilty verdict from the start, that the World Health Organization's new plan is in fact sexist, without ever making a compelling case. I realize this is an opinion piece, but surely there's still room for skepticism in the span of two pages. Even a mild skeptical investigation might lead one to ask, prior to condemnation, whether the WHO has done something similar to this in the past? Are they ideologically motivated? Could this be due to recent changes in leadership? Mistranslation to English? A grammatical error? Someone's best attempt at describing the time period during which a woman might be bearing children?

The WHO is an important organization making decisions with far reaching consequences. If you are going to sow seeds of distrust, please make the effort to do so responsibly. Take note from the surrounding pages that penetrate through the surface of the story with careful examination. I hope the contributors to SI will remember that if you're going to attribute malice in place of ignorance, you need to do so with a great deal of evidence.

Adam Spontarelli
Lynchburg, Virginia

Julia Lavarnway replies:

I did not say that the WHO is a sexist organization. The only time I even used the words sexist *and* sexism *was in the concluding paragraph when I wrote, "So is* the WHO's action plan *sexist?" (emphasis added) and "Bringing sexism* into scientific guidelines *does men and women alike a grave disservice" (emphasis added). I was writing a short commentary piece on one draft of a single action plan's suggestion that women of childbearing age not drink. If I were writing an in-depth article on the organization's attitudes toward women generally, then yes, I think it'd make sense to delve deeper into the WHO's history, motivations, etc. However, that was outside of the scope of this piece.*

'I Was Wrong'

I thoroughly enjoyed Ted Goertzel's "'I Was Wrong': Religious Prophesy and the 2020 Election," (September/October 2021) as well as the memorable issue of SI it was published in. It could have had the title prefix, "Oops, We Did It Again," because nothing could be much truer. This "I told you so" exposé was clearly sacrilegious, and *I* fear he may suffer the wrath of those total *believers*, but deservedly and gleefully so.

A thump on the Trump noggin is good medicine for the terminally ill-informed minions of chaos. The article makes clear the gullibility of those ignorant devotees. They will flock together and run off a cliff like a mob of doomed lemmings—with their banners waving. They know he's coming back … maybe to save them from themselves? Nothing that contradicts their state of thought will convince them of their error or lack of critical thinking. Regardless of their fate, it's worth reading about the willingness of the damned to accept it.

F. Edward Fisher
Chalmers, Indiana

[FEEDBACK

The letters column is a forum on matters raised in previous issues.

Letters should be no longer than 225 words.

Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Gabor Hrasko,
chairman of the European Council of
Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of
Saskatchewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell Labs,
then Silicon Valley), analyst of climate-
change denial, contributor to *DeSmogBlog*
and Skeptical Science, Portola Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist/ archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin–Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

THE MYTHS OF ENDLESS ENERGY
COLD FUSION THIRTY YEARS ON
THE ENERGY CATALYZER HOAX
The Sputtering Engine of Creator Belief
Cancer Screenings: Problems and Pitfalls
INTELLECTUAL HUMILITY: A GUIDING MAP FOR SKEPTICS
Skepticism and Pseudoexperiments
Creationists Continue Assault on Science
ALIENS
UFO Identification Process
Why Humanoid Aliens?
Might Aliens Be Worms?
Skeptical Inquirer
COVID-19 MISINFORMATION
Targeting Conspiracy Theories, Superstition, Lies, Immunity Myths
How to Think about the Pandemic
THE SCIENTIFIC FRAUDS BEHIND THE FALSE VACCINE-AUTISM CLAIM
THE POSSIBLE WORLDS OF ANN DRUYAN
STILL EMBATTLED AFTER ALL THESE YEARS
Project Greenglow
Creationism in Europe
THE SELFISH GENE
REVISITED
RICHARD DAWKINS
PROGRESS
Why Things Are Better Than You Think They Are
STEVEN PINKER

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON

Now Available Online!
Subscriptions & Single Issues

Visit Our Website to Learn More:
www.skepticalinquirer.org/subscribe

CENTERS FOR INQUIRY
www.centerforinquiry.org/about/branches

United States Branches

CFI Austin
Austin, Texas (512) 454-0977
austin@centerforinquiry.org

CFI Indiana
350 Canal Walk, Suite A
Indianapolis, Indiana 46202
(317) 423-0710
indy@centerforinquiry.org

CFI Long Island
Long Island, NY
(631) 793-9382
li@centerforinquiry.org

CFI Michigan
PO Box 3534, Grand Rapids, MI 49501-3534
michigan@centerforinquiry.org

CFI New York City
P.O. Box 26241, Brooklyn, NY 11202
nyc@centerforinquiry.org

CFI Northeast Ohio
PO Box 2379, Akron, OH 44309
(330) 798-0843
neohio@centerforinquiry.org

CFI Portland
PO Box 3378, Portland, OR 97208
(503) 593-7904
portland@centerforinquiry.org

CFI San Francisco
San Francisco, CA, sf@centerforinquiry.org

CFI Tampa Bay
Box 139 c/o O'Keefe
4011 S. Manhattan Ave., Tampa, FL 33611-1265
tampa@centerforinquiry.org

CFI Washington DC
1012 14th St. NW, Suite 205, Washington, DC 20005
(202) 733-5279 ext. 200
dc@centerforinquiry.org

CFI West
2535 W. Temple St, Los Angeles, CA 90026
(323) 666-9797, la@centerforinquiry.org

CFI Western New York
1310 Sweet Home Road, Amherst, NY 14228
(716) 636-4869 ext. 402
wny@centerforinquiry.org

International Branches

CFI Argentina
Los Antiguos, Santa Cruz Province,
Argentina
Alejandro Borgo
alejandroborgo@gmail.com

CFI Canada
PO Box 24006
Hazeldean RPO
Ottawa, ON
K2M 2C3
(613) 663-8198
info@centerforinquiry.ca

CFI China
China Research Institute for Science
Population
NO. 86, Xueyuan Nanlu Haidian Dist.
Beijing, 100081 China
8610-62170515
Zheng Nian
nzhjx@yahoo.com.cn

CFI France
Universite of Nice
Faculte Des Sciences
Parc Valrose, 06108
Nice Cedex 2, France
+33-489.15.02.28 (only on Wed. p.m.)
Henri Broch
Henri.Broch@unice.fr

CFI Kenya
Center For Inquiry–Kenya
United Youth Group House, Wing B
Makadara, Jogoo Road
Kenya
George Ongere
geongere@yahoo.com

CFI Peru
Calle El Corregidor 318
Urb. El Manzano, Rimac
Lima 25-PERU
Manuel Paz y Mino
mapymc@yahoo.com

CFI Poland
01-876 Warszawa
Ul. Broniewskiego 99/147
Poland
Andrzej Dominczak
dominiczak@wp.pl

CFI Spain
Madrid, Spain
Luis Alfonso Gamez
lgamez@terra.es

cfi CENTER FOR INQUIRY

CSI
CON
LAS 2022
VEGAS
SAVE THE DATES
October 20–23, 2022
Flamingo
Editorial credit: travelview - stock.adobe.com